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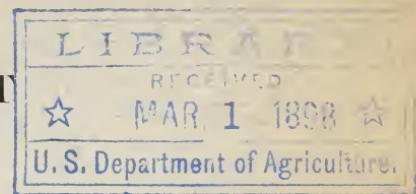
BULLETIN NO. 50.

236

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS.

A REPORT

ON THE



WORK AND EXPENDITURES

OF THE

AGRICULTURAL EXPERIMENT STATIONS

FOR

THE YEAR ENDED JUNE 30, 1897.

BY

A. C. TRUE,

DIRECTOR OF THE OFFICE OF EXPERIMENT STATIONS.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1898.

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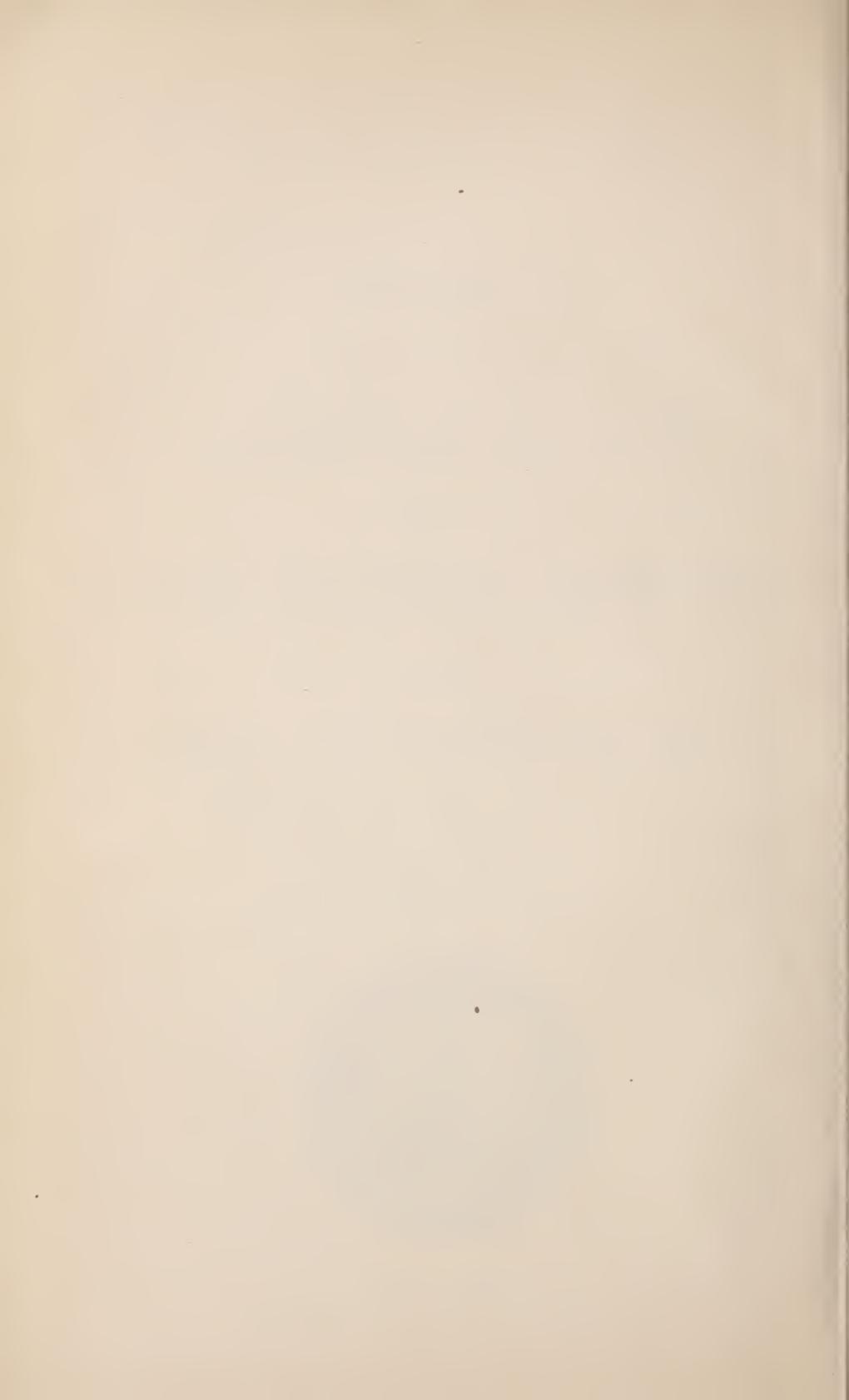
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D. C., January 17, 1898.

SIR: I have the honor to transmit herewith a copy of a report on the work and expenditures of the agricultural experiment stations for the fiscal year ended June 30, 1897, prepared under your instructions in compliance with the following provision of the act of Congress making appropriations for this Department for the said fiscal year:

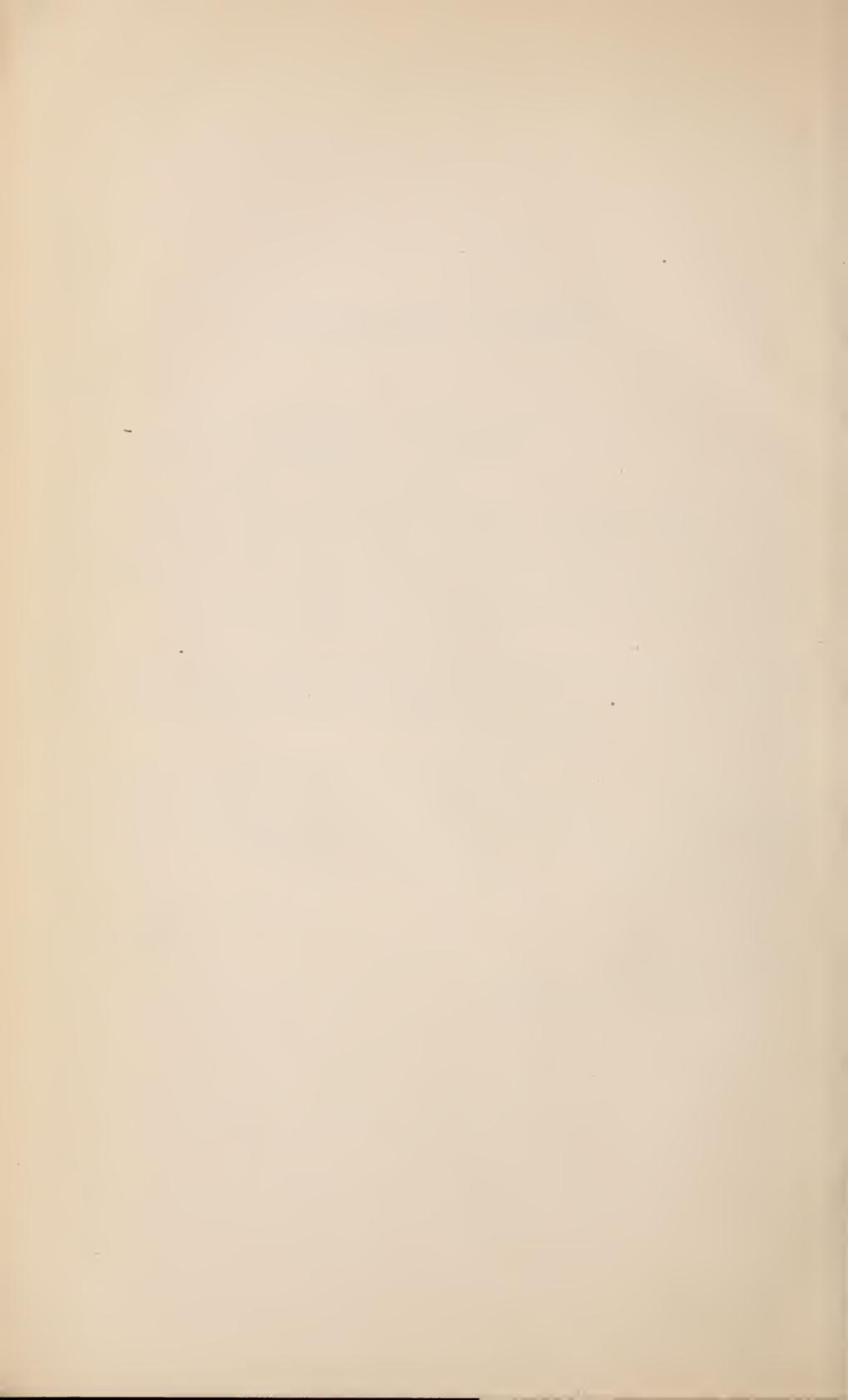
The Secretary of Agriculture shall prescribe the form of the annual financial statement required by section three of the said act of March second, eighteen hundred and eighty-seven; shall ascertain whether the expenditures under the appropriation hereby made are in accordance with the provisions of the said act, and shall make report thereon to Congress.

This report has been transmitted to Congress and has been printed as a document of the House of Representatives. A special edition has been ordered by Congress for the use of this Department, and I respectfully suggest that this be utilized as Bulletin No. 50 of this Office.

Respectfully,

A. C. TRUE,
Director.

JAMES WILSON,
Secretary of Agriculture.



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WORK AND EXPENDITURES OF THE AGRICULTURAL
EXPERIMENT STATIONS.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A REPORT OF THE SECRETARY OF AGRICULTURE ON THE WORK
AND EXPENDITURES OF THE AGRICULTURAL EXPERIMENT
STATIONS FOR THE FISCAL YEAR ENDED JUNE 30, 1897.

JANUARY 7, 1898.—Referred to the Committee on Agriculture and ordered to be
printed.

To the Senate and House of Representatives:

I transmit herewith a report of the Secretary of Agriculture on the work and expenditures of the agricultural experiment stations established under the act of Congress of March 2, 1887, for the fiscal year ended June 30, 1897, in accordance with the act making appropriations for the Department of Agriculture for the said fiscal year.

WILLIAM MCKINLEY.

EXECUTIVE MANSION, January 6, 1898.

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., January 5, 1898.

SIR: I have the honor to transmit herewith a report on the work and expenditures of the agricultural experiment stations established under the act of Congress of March 2, 1887, for the fiscal year ended June 30, 1897, in compliance with the following provision of the act making appropriations for this Department for the said fiscal year:

The Secretary of Agriculture shall prescribe the form of the annual financial statement required by section three of the said act of March second, eighteen

hundred and eighty-seven; shall ascertain whether the expenditures under the appropriation hereby made are in accordance with the provisions of the said act, and shall make report thereon to Congress.

I have the honor to be, sir, your obedient servant,

JAMES WILSON, *Secretary.*

The PRESIDENT.

OFFICE OF EXPERIMENT STATIONS,

Washington, D. C., December 20, 1897.

SIR: I have the honor to present herewith a report on the work and expenditures of the agricultural experiment stations for the fiscal year ended June 30, 1897.

Very respectfully,

A. C. TRUE, *Director.*

Hon. JAMES WILSON,
Secretary of Agriculture.

WORK AND EXPENDITURES OF THE AGRICULTURAL EXPERIMENT STATIONS FOR THE YEAR ENDED JUNE 30, 1897.

This is the third annual report on the work and expenditures of the agricultural experiment stations in the United States, made by the Director of the Office of Experiment Stations, under instructions from the Secretary of Agriculture. As heretofore, the report is based on three sources of information, viz: The annual financial statements of the stations, rendered on the schedules prescribed by the Secretary of Agriculture, in accordance with the act of Congress; the printed reports and bulletins of the stations; and the reports of personal examinations of the work and expenditures of the stations made during the past year by the Director and Assistant Director of the Office of Experiment Stations. All the stations, except those in Alabama, Mississippi, Louisiana, and Texas, were visited since the previous report was transmitted to Congress.

While the act of Congress of March 2, 1887, commonly known as the Hatch Act, does not require that the financial statements of the stations for the past fiscal year shall be made until February 1, 1898, the officers of the stations have readily acceded to the request of this Department for the prompt return of these statements after the close of the fiscal year, and in this way have made it possible to complete this report earlier than last year. State legislation regarding the reports of the operations of the stations, together with other causes affecting their business, have thus far made it impracticable for all the stations to follow the suggestions of this Department that these reports, as well as the financial statements, be made for the fiscal rather than the calendar year. A number of the stations have, however, made this change in the period covered by their reports, and it is hoped that ultimately this may become the general practice. In this way a more satisfactory report of the work of the stations during any one fiscal year may be made by this Department in time for transmission to Congress at or near the opening of its session in December.

THE FINANCIAL BUSINESS OF THE STATIONS.

From the point of view of this Department, representing the interests of the United States, the financial business of the stations is in better condition than ever before. The account of the Hatch fund is now, as a rule, kept distinct from that of other funds controlled by the station or the college of which the station is a department. The purposes for which the Hatch fund may be properly expended are more clearly defined, and the adjustment of expenditures as between the station and the other departments of the college have been more exactly made. Experience has clearly demonstrated that it is essential that a current account of the Hatch fund, which shall be distinct and separate from all other accounts, shall be kept, preferably in

accordance with a form recommended by this Department, and that this account shall be supported by a numbered series of detailed vouchers, each complete in itself as regards statement of the account, signature of the payee, and indorsement of the director or other executive officer of the station who is made responsible by the governing board for the expenditure of the fund for the purposes denominated in the Hatch Act. Owing to the complicated financial business of many of the institutions receiving the benefits of this act, it has been a matter of considerable difficulty to arrange the details of the accounting in a manner thoroughly satisfactory to all concerned. It is believed, however, that the expenditures on account of the Hatch fund are now recorded with substantial accuracy. The problems respecting the proper expenditure of this fund now relate almost entirely to questions of general policy, some of which will be briefly considered in this report.

THE SUBSTATIONS.

Considerable progress has been made during the past year in securing the reduction of expenditures from the Hatch fund on substations. In Idaho, Washington, Kansas, and Florida the substations have been entirely discontinued; in Wyoming, Colorado, New Mexico, Arizona, and Arkansas, the number of substations has been diminished, expenditures for permanent improvements have ceased, and other expenditures have been reduced. In this way a considerable portion of the Hatch fund hitherto largely thrown away or extravagantly expended on trivial experiments will hereafter be available for more thorough investigations under the immediate direction of the expert officers of the stations. Substations are maintained, as formerly, in California, Minnesota, and Texas, but in these States the experiment stations have at their command resources derived from the State to supplement the Hatch fund. In Connecticut, New York, and Alabama two separate stations are maintained with the aid of State funds, and in a similar way three stations are maintained in Louisiana.

FARM AND DAIRY OPERATIONS.

At a number of the stations farm and dairy operations are still conducted on too extensive a scale and with too little appreciation of the real requirements of experimental inquiries in agriculture. In this way a large amount of money is rapidly expended, the time and energies of the station officers are largely employed in routine duties, numerous petty and superficial experiments are made, and the truly useful results of experiment station work are materially reduced in number and importance. In saying this we do not wish to be understood as being in favor of confining the farm operations of the stations in all cases to small plats and a few animals. The size of the experimental field and the number of animals should depend on the nature and importance of the experiment as related to the funds available for this purpose. But it is clear that oftentimes stations attempt too many and too big field experiments and keep too large herds of animals. In these departments of the station business there is the greatest need for trained experts, careful planning, thorough execution, and economical management.

The causes for the unsatisfactory condition of the farm and dairy work of the stations are many, but two need particular attention at

this time. The notion is still too prevalent, and influences the action of governing boards in too large measure, that the station must follow the practice of the ordinary farmer in its farm operations and maintain different kinds of animals in considerable numbers. It is felt that there must be a certain showy element in its fields and barns which will attract the eye of the visiting farmer and lead him to commend the station as doing good farming. This is wholly wrong. The first lesson the farmer needs to learn when he visits an experiment station is that it is not a farm, but a working laboratory where science is doing what it can in its own way to help him solve problems that have never been solved by farmers and probably never will be by stations which imitate the farmer in his work. Everything should be done "decently and in order," with rigid and exact system; but bigness, variety, and show should be wholly incidental features. Happily, experience has shown the necessity for concentration and thoroughness of farm operations, and our best and most progressive stations are moving more rapidly each year in this direction.

RELATIONS OF COLLEGES AND STATIONS.

Another cause of too extensive farm and dairy operations by the stations grows out of their intimate connection with the land-grant colleges. These institutions are rapidly growing and expanding their work up to the full measure of their incomes, however liberal these may be. All our higher educational institutions perpetually need larger revenues than they actually receive. The agricultural college or department in many of the land-grant colleges is relatively small as regards numbers of students and at the same time is quite expensive to maintain. The small number of students in agriculture is not as a rule the fault of the governing board or faculty of the college. In many cases extraordinary inducements are made to attract students in agriculture. Causes inherent in the conditions of our agriculture have hitherto combined to make the number of students who desire or can avail themselves of a college course in agriculture relatively small. But the pressure for funds to maintain college courses and the small numbers of agricultural students have led directly and indirectly to encroachment on the station funds for the maintenance of the college farm and for other educational purposes. An easy way is to have the station run the college farm and keep all sorts of domestic animals. Some slight experimental feature can be readily attached to a great variety of farm operations; records of rations, milk yield, etc., can be easily kept with more or less regularity, and in this and other ways the governing board may really think it is advancing the interests of agriculture by experiments and carrying out the provisions of the Hatch Act. This of course is a sham, and the farmers will get little good out of the station farms until they are run on a strictly experimental basis.

There is still some difficulty in securing a proper adjustment of the salaries and work of officers employed in both college and station. Teaching involves the regular performance of routine duties, which constitute a drain upon the energies of the teacher that can not easily be measured by the time spent in the class room. The value of the best performance of either teaching or experimenting can not be estimated in terms of the hours actually spent at the task. The essential thing is that the worker, whether teaching or experimenting, shall have such full command of his time and energies as to secure the best

results of which he is capable. As things actually exist in the land-grant institutions, it is believed that in some cases the station is practically defrauded, and in other cases the arrangement does not give satisfactory results to either college or station. There is need of more careful attention to this subject on the part of governing boards. In a few instances the governing board has shown a disposition to impose teaching duties on station officers without paying any portion of their salaries from college funds. This is plainly a violation of the Hatch Act and should be resisted.

To define more exactly the policy of the Department on this matter, the following official opinion has been recently formulated and sent to the directors and other executive officers of all the stations:

This Department holds that no portion of the funds appropriated by Congress, in accordance with the act of March 2, 1887, can legally be used either directly or indirectly for paying the salaries or wages of professors, teachers, or other persons whose duties are confined to teaching, administration, or other work in connection with the courses of instruction given in the colleges with which the stations are connected or in any other educational institution; nor should any other expenses connected with the work or facilities for instruction in school or college courses be paid from said fund. In case the same persons are employed in both the experiment station and the other departments of the college with which the station is connected, a fair and equitable division of salaries or wages should be made, and in case of any other expenditures for the joint benefit of the experiment station and the other departments of the college, the aforesaid funds should be charged with only a fair share of such expenditures.

While a thoroughly satisfactory state of things as regards the relations of the stations to the colleges has not yet been reached, much progress has been made in this direction. The officers of the stations are, as a rule, in harmony with the Department on this question, and the views of the members of the governing boards who have had any experience in dealing with this matter are becoming more definitely settled in right lines.

BAD EFFECTS OF FREQUENT CHANGES OF OFFICERS.

In one respect the past year has been a period of unusual discouragement to those who have the best interests of the experiment stations at heart. From changes in the constitution of the governing boards, due to legislative action, changes in the governors having power of appointment or removal of members of these boards, and other causes, the directors of the stations in ten States and Territories have been changed since the last report was prepared. In several cases the directors removed had had long and successful experience in the management of the stations and had made their work increasingly useful. In these and other cases removal of the director was accompanied by a further reorganization of the station staff. When we consider the comparative scarcity of well-trained men who are thoroughly competent to conduct experimental inquiries, the numerous changes in the personnel of the station staffs during the past year is quite disheartening. Thorough agricultural investigations require long and persistent effort, in accordance with a careful plan consistently followed, it may be, for years before a final and satisfactory result is reached. Nothing could have a more powerful tendency to keep good investigators away from our stations and to produce a structural weakness in their operations than a vacillating policy of management. Station officers should be chosen for their fitness and ability as determined by the standards of their profession, and they

should be made secure in their positions as long as neither their reputations nor their efficiency are condemned by competent and impartial critics. Educational institutions are always weak when their officers are frequently changed, and an atmosphere of uncertainty pervades their operations. The case is even worse with institutions for original research like the experiment stations. Political and personal considerations are absolutely out of place in determining the appointment and continuance of college and station officers. Wherever a community permits changes in the station staff for such reasons, it condemns itself to suffer from the relative weakness of its station. There is great need that the intelligent farmers and other friends of the stations should come to their aid in this regard and insist on their maintenance on the policy which experience clearly shows alone can secure their success.

The numerous changes in the station staffs recently made are calculated to shake faith in the wisdom of committing the stations so fully to the control of the local boards. Violent and unreasonable changes in one or two stations tend to produce an unsettled feeling among the whole body of station workers throughout the country. Already there is considerable sentiment in favor of extending the functions of the National Government in the supervision of the stations so far as to secure more permanent tenure of office for the investigators. It will be far better if the local appointing officers and boards will recognize their plain duty in this matter and take such action themselves as will defend the funds committed to their care by the nation from being wasted in the frequent shifting of the charge of the stations from one set of men to another, so that the carrying out of thorough investigations is practically impossible. It should be clearly understood that under existing conditions this Department can do comparatively little to help the stations where frequent changes are occurring in the personnel of the governing boards and station staffs. The chief benefit which the stations may derive from the advisory relations of this Department to them will grow out of such personal intercourse between the officers of the Department and of the stations as will admit of intelligent discussion of local problems of station business as related to the teaching of experience regarding the management of agricultural investigations, viewed from the impartial standpoint of the central office. There must also be opportunity for the Department to explain its policy regarding the stations and to answer objections arising from the seeming necessities imposed by the local environment. When the membership of governing boards and station staffs changes rapidly inexperience often leads to precipitate action before the Department can be heard in the matter and its previous efforts to advance the interests of the station are rendered entirely nugatory. Until the affairs of some stations become more settled there is little prospect that any remedy can be found for the weaknesses from which they are evidently suffering.

EVIDENCES OF THE SUCCESS OF THE STATIONS.

The past year has brought out many encouraging evidences of the strength of the stations in the confidence and support of the farmers, based on the aid which they are actually giving to agricultural enterprises through their experiments and their publications. The States have, in many instances, continued or enlarged the appropriations

for the stations in addition to the funds given by the National Government. Many of the States pay the printing bills, which are everywhere a growing item of station expense. Others have given considerable funds for the erection or enlargement of station buildings. The equipment of the stations is everywhere steadily improving. As a rule the expert officers of the stations working along scientific lines are receiving a larger measure of encouragement than ever before. The importance and authority of the station officers as experts whose knowledge and judgment may be safely relied upon to aid in the enforcement of laws to protect the farmer from fraud or injury have been increasingly recognized. The stations have for years performed very important and valuable services in connection with the control of the sale of commercial fertilizers. Laws recently passed in a number of States impose upon them similar duties regarding feeding stuffs, dairy products, nursery stock, or injurious insects. Indeed, the danger is that our stations will be overloaded with routine and police duties and the demands upon them to act as bureaus of information. There has been no more notable indication of the rapid increase of original investigation in this country than is shown in the remarkable development of scientific effort in agricultural investigations at some of our best experiment stations. Success has brought confidence, and the people are most heartily supporting those stations which are doing the most thorough work. There is every reason to believe that in agricultural research, as in other lines of scientific inquiry, the useful results will accumulate in increasing ratio, and that the foundations are being laid for far wider success in the not far distant future. It is impracticable in a report of this character to give an adequate résumé of the progress of agricultural research in this country during the past year. Some idea of the variety and relative importance of the information published by the several stations may be gained from a perusal of the statements regarding their publications made further on in the report. An examination of the last volume of the Experiment Station Record issued by the Department would reveal much of interest in their recent work. A few of the most striking results may, however, serve as illustrations of the outcome of the work of the stations in some lines.

The ripening of cheese has long been thought to be due to the action of bacteria. A preliminary report of researches at the Wisconsin station, recently published, announces that it has been definitely shown that this process is chemical rather than bacteriological, being caused by chemical ferments present in milk as drawn from the cow. This fundamental discovery may ultimately have most important practical results affecting the industry of cheese making. Another discovery of considerable importance to the dairy industry as conducted under modern conditions is that the consistency of cream raised by the separator may readily and safely be restored by the addition of a small quantity of sucrate of lime. The Iowa station has shown by carefully conducted slaughter and block tests that there is no material difference in the character, composition, and quality of meat from steers and heifers grown under like conditions, and that therefore the discrimination against heifer meat on the part of butchers is not well founded. Several stations have reported valuable experiments in the feeding of sheep, especially for meat, a matter of much importance in view of the wide extension of the market for lamb and mutton in recent years.

The great value of alfalfa as a forage plant in the vast semiarid regions west of the Mississippi River is well known to every student of the recent progress of our agriculture. During the past year the stations have brought out a number of bulletins recording investigations on the nature and uses of this plant. Wheat is just now attracting unusual attention in the agricultural world. Besides numerous trials of varieties and methods of culture, the stations have made important studies on the constituents of wheat which have already given useful results in determining the relative value of different varieties with reference to their baking and milling qualities.

Such things as the use of formalin, instead of the very poisonous corrosive sublimate, to prevent potato scab; the spraying of peach trees with whitewash to protect them against injury by freezing; a new method for keeping grapes fresh for the market for a much longer time than has hitherto been practicable, may need further experience to demonstrate fully their usefulness, but will at least indicate the direct and wide practical application which may be made of station work successfully done.

CORDIAL RELATIONS BETWEEN THE DEPARTMENT AND THE STATIONS.

The development of cordial relations between the stations and this Department has presented many encouraging and gratifying features. It has been the aim of the Department to bring to the stations the results of a wide and impartial view of the general principles of station management as wrought out by experience in such affairs at home and abroad, and to aid in adapting these principles to the conditions of local environment through personal conferences with station officers. Study and discussion of the many perplexing problems of station business have been profitable in many ways. Without in the least interfering with the free choice and execution of enterprises suited to the agriculture of their several localities, it has been found possible to do much toward making the individual stations feel that they are truly parts of a great national system of institutions working for the benefit of the agriculture of the whole country. The stronger stations have shown a kindly disposition to aid the weaker ones in developing their work, and by a certain spirit of self-restraint have exerted a powerful influence toward keeping the station enterprise within right lines. On the other hand, the stations handicapped by limited resources and other unfortunate conditions, have, in many instances, made gallant efforts to raise the grade and strength of their enterprises. And in general there has been a growing appreciation of the fact that "if one member suffer, all the members suffer with it."

Much progress has also been made in the organization of cooperative enterprises between the stations and different branches of this Department along some lines. In such arrangements the Department contributes funds for special investigations to be carried on in different parts of the country, furnishes materials collected in this and other countries, or gives the stations the benefit of expert advice or general supervision in particular directions. The stations, on their part, give laboratory facilities, expert services, or organization and supervision of details of investigations and, what is often most essential and valuable, secure the intelligent cooperation of practical agriculturists in their several communities. In this way the funds of both the Department and the stations are most economically and efficiently employed

for the general benefit of our agriculture. Cooperative experiments of this character have been conducted the past year with sugar beets, forage plants and grasses, on soils, in forestry, and on problems relating to the food and nutrition of man.

THE ASSOCIATION OF COLLEGES AND STATIONS.

The Association of American Agricultural Colleges and Experiment Stations is doing much to strengthen the bonds of friendship and cooperative efforts between the stations and to promote their mutual interests. Its work is also serving to bring more clearly to view the interdependence and at the same time the individuality of the stations and the other departments of the land-grant colleges. A brief account of the successful meeting of this association at Minneapolis last summer is given farther on in this report.

THE OFFICE OF EXPERIMENT STATIONS.

Besides the work done in supervision of the expenditures of the stations and in conferences and correspondence with station officers, this office has been engaged more busily the past year than ever before in the collection and dissemination of information regarding the progress of agricultural investigations throughout the world.

During the year the office issued 39 documents, aggregating 2,607 pages, principally based on the work of the experiment stations. These documents include 12 numbers of the Experiment Station Record, with detailed index, 12 bulletins, 6 farmers' bulletins, 6 circulars, the annual report of the director, a report to Congress on the work and expenditures of the experiment stations, and an article for the Yearbook of the Department. About 3,000 cards of the Index of Experiment Station Literature were published and distributed to the stations last year. The total number of these cards has now reached 15,000.

The wide extent and variety of agricultural investigations at the present time is indicated in the following brief statement regarding the Experiment Station Record: The eighth volume of the Experiment Station Record comprises 1,210 pages, and contains abstracts of 340 bulletins and 62 annual reports of 53 experiment stations in the United States, 92 publications of the Department of Agriculture, and 702 reports of foreign investigations. The total number of pages in these publications is 38,552. The total number of articles abstracted is 1,565, classified as follows: Chemistry, 157; botany, 69; fermentation and bacteriology, 5; zoology, 10; meteorology, 54; air, water, and soils, 55; fertilizers, 103; field crops, 228; horticulture, 154; forestry, 11; seeds and weeds, 29; diseases of plants, 79; entomology, 126; foods and animal production, 177; veterinary science, 51; dairying, 139; technology, 4; agricultural engineering, 22; statistics, 92. Classified lists of articles, in some cases with brief abstracts, are also given in each number. The aggregate number of titles thus reported is 2,200.

STATISTICS OF THE STATIONS.

Agricultural experiment stations are now in operation under the act of Congress of March 2, 1887, in all the States and Territories. Alaska is the only section of the United States which has no experiment station. A preliminary investigation regarding the feasibility

of conducting agricultural experiments in Alaska has, however, been made by the Department this year.¹ In each of the States of Alabama, Connecticut, New Jersey, and New York a separate station is maintained wholly or in part by State funds, and in Louisiana a station for sugar experiments is maintained partly by funds contributed by sugar planters. Excluding the branch stations established in several States, the total number of stations in the United States is 54. Of these, 52 receive the appropriation provided for in the act of Congress above mentioned. The total income of the stations during 1897 was \$1,129,832.99, of which \$719,993.47 was received from the National Government, the remainder, \$409,839.52, coming from the following sources: State governments, \$287,176.35; individuals and communities, \$5,553.88; fees for analyses of fertilizers, \$37,265.26; sales of farm products, \$64,437.83; miscellaneous, \$16,906.20. In addition to this the Office of Experiment Stations had an appropriation of \$35,000 for the past fiscal year, including \$5,000 for the Alaskan investigation. The value of additions to equipment of the stations in 1897 is estimated as follows: Buildings, \$74,830.99; libraries, \$12,993.25; apparatus, \$21,149.73; farm implements, \$13,178.25; live stock, \$14,733.07; miscellaneous, \$7,714.08; total, \$143,599.38.

The stations employ 628 persons in the work of administration and inquiry. The number of officers engaged in the different lines of work is as follows: Directors, 67; chemists, 134; agriculturists, 66; horticulturists, 71; farm foremen, 38; dairymen, 19; botanists, 47; entomologists, 48; veterinarians, 30; meteorologists, 18; biologists, 8; physicists, 9; geologists, 6; mycologists and bacteriologists, 21; irrigation engineers, 6; in charge of substations, 11; secretaries and treasurers, 70; librarians, 9, and clerks, 38. There are also 30 persons classified under the head of "miscellaneous," including superintendents of gardens, grounds, and buildings, apiarists, herdsmen, etc. Two hundred and eighty-three station officers do more or less teaching in the colleges with which the stations are connected.

During 1897 the stations published 54 annual reports and 324 bulletins. Besides regular reports and bulletins, a number of the stations issued press bulletins, which were widely reproduced in the agricultural and county papers. The mailing lists of the stations now aggregate 506,100 names. Correspondence with farmers steadily increases and calls upon station officers for public addresses at institutes and other meetings of farmers are more numerous than ever. The station officers continue to contribute many articles on special topics to agricultural and scientific journals.

ALABAMA.

Agricultural Experiment Station of the Agricultural and Mechanical College of Alabama, Auburn.

DEPARTMENT OF THE AGRICULTURAL AND MECHANICAL COLLEGE OF ALABAMA.

The work of the Alabama Station during the past year has been mainly along the same lines as heretofore, including investigations on cotton, especially the crossing of varieties, pot and field experiments with fertilizers, culture and seeding experiments, and studies of diseases; field experiments with leguminous plants, tobacco, sweet potato-

¹A report on the investigation on agriculture in Alaska has been published as House Doc. No. 160, 55th Congress, 2d session.

toes, sorghum, etc.; pig feeding experiments; botanical investigations; chemical studies on soils, fertilizers, etc.; biological and horticultural investigations, including studies of diseases of plants; investigations on animal diseases; and entomological investigations. The station has continued the analysis and inspection of fertilizers under State laws. An entomologist was added to the staff of the station in the fall of 1896.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State fertilizer tax (including balance from previous year)	12,238.27
Farm products	667.61
 Total	 27,905.88

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 72-79 and Index Volumes 2 and 3.

Bulletin 72, pp. 24, figs. 12.—A Study of Skin Tumors of Horses and Mules in Alabama.—This is a thesis prepared by S. L. Coleman, of the college, for a post-graduate degree. It gives general observations upon causes, macroscopical and microscopical characteristics, and surgical and medical treatment of affections of this kind, based upon studies of cases brought to the free clinics of the college.

Bulletin 73, pp. 10, figs. 3.—Edible Fungi: A Wasted Food Product.—Popular notes on mushrooms, their uses, and descriptions of two of the most common edible mushrooms growing in Alabama. Brief notes are also given on puffballs, and some of the more important American bibliography relating to mushrooms is mentioned.

Bulletin 74, pp. 10.—Flour, Considered from the Standpoint of Nutrition.—The relative value of bread made from whole wheat and fine wheat flour is discussed, and a receipt given for making bread from whole-wheat flour. Analyses are given of flour of entire wheat and fine wheat flour, and the amounts of nutrients in a barrel of each are calculated.

Bulletin 75, pp. 22.—Experiments with Corn.—Results of a test of 14 varieties, with tabular data on the relative yield of varieties of corn in a number of Southern States; investigations on the relative value of seed corn from different latitudes; butt, middle, and tip kernels for seed; distances for upland corn; fertilizer experiments; methods of harvesting corn; and on burning weeds versus plowing them under.

Bulletin 76, pp. 23.—Experiments with Cotton.—This bulletin embraces results of tests with 17 varieties of cotton; investigations on the value of seed from different latitudes; the use of the roller in cotton planting; distance experiments; barring off; subsoiling and liming; and various fertilizer experiments.

Bulletin 77, pp. 8.—The San José Scale; Some Other Insect Pests.—A popular bulletin warning the fruit growers against the San José Scale, with brief notes on the tomato worm, grape-leaf hoppers, and cabbage worms.

Bulletin 78, pp. 45.—Cooperative Fertilizer Experiments with Cotton in 1896.—A report is given on the results secured in 27 fertilizer experiments carried on in as many localities under the same instructions, in addition to experiments on the station farm.

Bulletin 79, pp. 26.—Some Horticultural Suggestions.—Popular notes on the subject of fruit culture, shipping, etc.

Index Volume 2, pp. 19.—Index to Bulletins 1 to 21, new series.

Index Volume 3, pp. 24.—Index to Bulletins 22 to 58.

The work of the Alabama Station has been actively prosecuted during the past year. The station is being managed on a progressive policy, and its operations are increasing in efficiency and success.

Canebrake Agricultural Experiment Station, Uniontown.

The Alabama Canebrake Station has continued to confine its operations to field experiments with various crops and investigations on the diseases of animals.

The income of the station during the past year was as follows:

State appropriation.....	\$2,500
Farm products.....	325
Total.....	2,825

The only publication issued during the year was a brief annual report for the calendar year 1896.

ARIZONA.

Agricultural Experiment Station of the University of Arizona, Tucson.

DEPARTMENT OF THE UNIVERSITY OF ARIZONA.

The Arizona Station has continued its work during the past year mainly along the same lines as heretofore. Experiments have been made with a considerable number of varieties of semitropical and other fruits, canaigre, tobacco, ramie, sugar beets, grasses and forage plants, and problems connected with the growing of various crops under irrigation have been studied. Chemical investigations of canaigre, soils, water, and milk; botanical studies of weeds and diseases of plants, especially crown root knot; and entomological investigations have also been pursued. The substation at Phoenix has been continued and the work there, consisting largely of experiments with fruits, has been intelligently and carefully conducted. Expenditures from United States funds for permanent improvements at the substation have ceased. Most of the experimental work on the poor land near the university buildings has been given up, and 10 acres of irrigated land near Tucson have been leased for five years, the rent being paid from Territorial funds. A forcing house, erected on the university campus, has been made available for station purposes. The Territorial funds for the support of the university have been materially increased by recent legislative enactment, and this will incidentally be of considerable advantage to the station. Cooperative experiments with sugar beets and tobacco are in progress in a number of localities, and successful efforts have been made to aid the farmers in the repression of animal diseases.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000
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A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of the station received during the past fiscal year were Bulletins Nos. 19-23.

Bulletin 19, pp. 8.—Sixth Annual Report.—A brief report by the director on the work of the year, with list of bulletins published,

acknowledgments and exchanges, and a financial statement for the fiscal year ending June 30, 1895.

Bulletin 20, pp. 38.—Arizona Weather.—Summaries of observations on temperature, pressure, precipitation, humidity, evaporation, sunshine, and wind movement in the vicinity of Tucson and at other points in the Territory during about four years ending June, 1895, with comparisons with similar data obtained at important cities in other parts of the United States.

Bulletin 21, pp. 35, figs. 6.—*Canaigre.*—Includes notes on the canaigre plant—habitat, description, conditions of growth, insect enemies, and diseases—and the results of extended investigations on the formation and distribution in the plant of tanning materials; chemical life history of the plant; the effect of sprouting, irrigation, and dormant state on tanning materials; conditions causing destruction and loss of tanning materials, coloring matter, and nonsoluble tannins found in the plant; food and fuel value of canaigre bagasse; relation of canaigre to the soil; and notes on the canaigre industry.

Bulletin 22, pp. 32, figs. 12.—*Something about Weeds.*—Popular notes on weeds in general, with descriptive notes on a number of domestic and introduced weeds, and a table of 50 Arizona weeds, showing methods of propagation and other characteristics.

Bulletin 23, pp. 44, figs. 4.—*Sugar Beets.*—A popular bulletin on the sugar-beet industry in this and foreign countries, with notes on the climatology of the sugar beet and brief directions for its culture.

The Arizona station has made encouraging progress in strengthening its work and economizing its resources during the past year. The conditions under which the work at Tucson is carried on are greatly improved, the concentration of the substation work at Phoenix has been beneficial, and the undertaking of cooperative enterprises has brought the station into closer touch with the people of different parts of the Territory. Recently, however, the president of the university has resigned and the director of the station and superintendent of the substation have been removed. The outlook of the station is therefore much more uncertain than at the close of the past fiscal year.

ARKANSAS.

Arkansas Agricultural Experiment Station, Fayetteville.

DEPARTMENT OF ARKANSAS INDUSTRIAL UNIVERSITY.

The Arkansas Station has continued work in the same lines as heretofore. Field experiments with cotton, potatoes, and forage crops; feeding experiments with pigs; chemical investigations of wheat and its mill products; horticultural studies of orchard and small fruits and vegetables; bacteriological and other investigations of animal diseases have constituted the main work of the station. The substations at Camden and Newport were continued during the past year, but the expenditures from the United States funds for this purpose were reduced. The substation at Camden will be discontinued at the conclusion of the season's operations; that at Newport will be continued for the present, especially for experiments with a view to improving methods of production of animals, particularly sheep and cattle.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	42.65
Total.	15,042.65

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins Nos. 40-44 and the Annual Report for 1896.

Bulletin 40, pp. 10.—On the Toxic Properties of Molds.—Field Investigations of Various Stock Diseases.—This gives the results of investigations on the effect of feeding molded corn and cultures of molds to two 2-year-old colts; notes on Texas cattle fever in various parts of the State; results of mallein tests for suspected glanders with 7 horses, and the results of an investigation on hog diseases and of 3 post-mortems.

Bulletin 41, pp. 13.—Pork Production on Crops Gathered by Hogs.—A Succession of Crops for Hogs.—Results of investigations made to determine the adaptability of different crops in a rotation for hogs; the cost of rearing 10-month pigs on foods gathered by themselves and grown on soil of known fertility; and to ascertain a system of rearing pigs for pork with a minimum quantity of corn.

Bulletin 42, pp. 44.—Concerning Wheat and its Mill Products.—This bulletin gives the result of extended investigations on the products of small mills and their chemical composition; classification of flours; the fertilizing elements contained in wheat; loss in wheat during sprouting; composition of the ash of a wheat and its mill products; and studies concerning the proteids of wheat and a method for their quantitative separation.

Bulletin 43, pp. 46, figs. 8.—Report of the Horticulturist.—Descriptive notes and tabulated data on 59 varieties of strawberries, with replies to circular inquiries by leading horticulturists of the State as to culture and best varieties; notes on the culture of various small fruits, including grapes, and on the station peach and apple orchard; and short descriptions of some of the more injurious insects of the year, with remedies, and brief notes on pear blight and its treatment.

Bulletin 44, pp. 48.—Vegetable Gardening.—A popular bulletin designed to furnish information relative to the culture of garden vegetables in Arkansas. It is largely based on results obtained in experiments made at the Camden substation during the past three years.

Annual Report for 1896, pp. 120.—Includes a financial statement for the fiscal year ending June 30, 1896; brief report by the director on the work of the year, and reprints of Bulletins 38-43.

The Arkansas Station continues to be managed on a conservative and economical policy. The interest of the farmers and fruit growers of the State in the operations and reports of the station is evidently growing. The publications of the station issued during the past year show a decided increase in the amount of original work completed, a considerable part of which is of interest and value outside of the State for which it was primarily intended. The station needs better land for its field work at Fayetteville, and it is hoped that the effort now being made to secure State aid in this direction will be successful.

CALIFORNIA.

Agricultural Experiment Station of the University of California, Berkeley.

DEPARTMENT OF THE UNIVERSITY OF CALIFORNIA.

The work of the California Station during the past year has included chemical and physical investigations of soils, especially of alkali lands with reference to reclamation; analyses of waters, foods, feeding

stuffs, sugar beets, sugar cane, fruits, nuts, canaigre, etc.; investigations in the fertilization of citrus trees, the culture of olives and the making of olive oil, and in viticulture and vinification; entomological investigations; studies in botany, horticulture, and forestry, and culture experiments with a great variety of forage plants, cereals, vegetables, fruits, and forest trees at the central station and at six outlying substations, with special reference to the varied climatic and soil conditions of the State. A special study of native plants growing upon alkali soils of different strength and character, as well as of the tolerance of culture plants and crops for alkali, has been made. Food investigations in cooperation with this Department undertaken last year have been continued. The carefully guarded plan of distribution of new varieties of seeds and plants to persons in the State who are willing to pay expenses of the distribution is still continued. Experiments were successfully made with an apparatus devised by the station for the purposes of cooling fermenting wine musts when the heat rises too high. It is based on the principle of evaporation of fine spray acting on a cooling coil, thus preventing the "sticking" of partly fermented wines, which causes such heavy loss every year. The same experiments will be continued during the coming year with an improved form of the apparatus.

On April 16, 1897, the building of the College of Agriculture and Experiment Station was burned, involving a loss to the university of about \$9,000 on the building itself, \$6,000 in apparatus and supplies, besides collections of soils and other material, valuable manuscripts, and nearly all of the former annual reports and bulletins of this station, which can not easily be replaced, and whose value can hardly be fairly estimated. The work in the laboratories of the station was thus interrupted for several months, until a larger, better, and more commodious building could be built upon the site of the old one and again equipped.

The manuscript of the annual reports for 1896 and 1897 has been in readiness for the printer for some time, but owing to the veto of the State printing appropriation bill by the governor it could not be put into type. The board of regents of the university have recently determined to enlarge the printing facilities of the university printing office, and it is hoped that before very long the report of the station for the past two years will be ready for distribution.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State appropriation	16,137.00
Farm products	\$9.25
Total.....	31,226.25

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 111-115, and a report of the Viticultural Division and Appendix.

Bulletin 111, pp. 17.—The Work of the College of Agriculture and Experiment Stations.—A popular article treating of the work of instruction and research of the College of Agriculture and Experiment Stations of the University of California.

Bulletin 112, pp. 8.—Distribution of Seeds and Plants.—A descrip-

tive list of seeds and plants offered by the station for distribution to citizens of the State.

Bulletin 113, pp. 15.—California Walnuts, Almonds, and Chestnuts; their Composition and Draft upon the Soil.—The Bleaching of Nuts by Dipping.—Results are given of the physical analyses and the ash and nitrogen content of the various parts of walnuts, almonds, and chestnuts, and of investigations on the food value of these nuts. The methods employed at the station in the bleaching of nuts are also given.

Bulletin 114, pp. 9, figs. 2.—The Causes of Frogging and Bloating of Prunes.—Results of observations and experiments in factories and the laboratory, together with a record of other facts obtained from those engaged in drying prunes.

Bulletin 115, pp. 15.—Remedies for Insects and Fungi.—Popular notes on the classes of insects and fungi, with remarks on remedies, gas treatment, sprays, washes, etc.

Report of the Viticultural Work during the Seasons 1887–1893, with data regarding the Vintages of 1894–95, pp. 466.—This embraces a report of a series of systematic investigations on the composition and classification of grapes, musts, and wines; investigations of various types of grapes, their adaptability to different localities, value for wine making and other purposes, descriptions of red and white wine, raisin, table, and other grapes; records of work in the viticultural laboratory and of wines received for examination; notes on recently imported grapes, the phylloxera, and general principles of fermentations; experiments with pure and selected yeasts; fermentation experiments at high temperatures and with various substances; experiments with color grapes and with asaprol; investigations on the nitrogen in musts and wines by varieties, regions, types, etc., and miscellaneous notes on methods of preservation of fresh grapes, sunstroke of the vine, and the mold *Botrytis cinerea*; together with a list of the viticultural publications of the college and of the viticultural commission.

Appendix to Viticultural Report, pp. 53, figs. 13.—Resistant Vines; their Selection, Adaptation, and Grafting.—A popular bulletin, designed to give information with regard to replanting vineyards destroyed by phylloxera and “to correct misconceptions of some fundamental principles.”

In spite of the losses sustained in the burning of its laboratories, the California Station has accomplished much useful work during the past year. Its work is increasing in value and importance to the State, and the permanent policy of its management gives assurance of continued success in its operations. The university with which it is connected is steadily gaining in resources, number of students, and influence in its relations to the work of education and research carried on by the State. Recent legislation giving the university the proceeds of a permanent tax will incidentally inure to the benefit of the station. The governor of the State recently vetoed a bill providing for the maintenance of forestry substations on the ground that the university has funds which should be used for any experimental work which is needed in the State. The effect of this may ultimately be to bring the work connected with investigations in behalf of agriculture, horticulture, and forestry more completely under the control of the university. It is believed that such concentration will be likely to secure more efficient and economical service along lines of scientific effort in behalf of these important industries than has hitherto been found practicable to obtain.

COLORADO.

Agricultural Experiment Station, Fort Collins.

DEPARTMENT OF THE STATE AGRICULTURAL COLLEGE OF COLORADO.

The Colorado Station has continued its work on irrigation problems, meteorology, field crops, feeding of animals, large and small fruits, entomology, botany, and chemistry. Among the more important investigations are those relating to the duty of water, losses by seepage and evaporation, return waters, the chemistry of irrigation waters, the digestibility of the albuminoids of alfalfa hay, the effects of growing beets on alkali lands, and feeding of milch cows, sheep, and hogs. Studies regarding alfalfa have engaged the attention of different divisions of the station, and a valuable bulletin on this subject was issued during the past year. Coöperative work with this Department in forestry and with sugar beets has been undertaken. The substations at Cheyenne Wells and Rocky Ford have been continued, but under unsatisfactory conditions. The work at Cheyenne Wells, considered as a temporary enterprise to determine the agricultural possibilities of the locality, may prove of some value, but no good reason has been assigned for a permanent substation there. The substation at Rocky Ford has suffered the usual vicissitudes attending the prosecution of station work under ill-trained superintendents, and is clearly an expensive venture without important results. The State is building a new chemical laboratory at the college, in which the station will have greatly improved facilities for chemical investigations.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	581.37
Miscellaneous	1,777.39
Total	17,358.76

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of the station received during the past fiscal year were Bulletins Nos. 35-38 and the Annual Report for 1896.

Bulletin 35, pp. 95, pls. 18.—Alfalfa.—A comprehensive bulletin on the alfalfa plant, its history, description, composition, structure, culture, fertilizing value, vitality of seed, varietal differences, etc., largely based upon results of station investigations.

Bulletin 36, pp. 23.—Sugar Beets.—A popular bulletin on sugar-beet culture, based largely on the results reported in former publications of the station, with tables of analyses of sugar beets grown in the State.

Bulletin 37, pp. 143.—The Birds of Colorado.—This bulletin sets forth the present knowledge of the distribution and migration of Colorado birds, and includes a bibliography of the subject and an historical review of the progress of ornithological investigations in the State.

Bulletin 38, pp. 40, figs. 4.—Sheep Scab.—A Few Insect Enemies of the Orchard.—Popular remarks on this disease, giving the results of experiments for the destruction of scab mites and their eggs, with notes on the various dips used. Brief popular notes with recommendations as to remedies are also given on a number of insect enemies of the orchard.

Annual Report for 1896, pp. 105.—A report by the director on the present status of the station and substations, station personnel, and work; reports by the heads of departments and by the superintendents of the San Luis Valley, Arkansas Valley, and Rain Belt substations on the work of the year, giving results in some cases; and a financial statement for the fiscal year ending June 30, 1896.

The work of the Colorado Station is being strengthened and developed along lines of great usefulness to a wide region of the West. The importance and value of thorough experimental inquiries in behalf of agriculture is being more fully appreciated by the managers of the station and by the agricultural public of the State. When once the station is relieved of the expensive and wasteful burden imposed by the substations, it will undoubtedly be able to do still better service through cooperative and other enterprises affecting the vital interests of the agriculture of the entire State.

CONNECTICUT.

The Connecticut Agricultural Experiment Station, New Haven.

The Connecticut State Station continues to make chemical and experimental studies of fertilizers a leading feature of its work, but is also carrying on important investigations of plant diseases and of the constituents, especially the proteids, of feeding stuffs, and other agricultural products. Greenhouse experiments on the manuring of tomatoes, radishes, carnations, etc., have been conducted on quite an extensive scale. The availability of different forms of organic nitrogen has also been studied. Pot experiments have been made with ground bone of different degrees of fineness. The valuable investigations on the proteids of various grains and seeds have been continued. For several years the station has carried on tobacco experiments in cooperation with the Tobacco Growers' Association. This year the work was on curing tobacco by artificial heat, to study the effect on the quality of the tobacco, the saving of time, and the avoidance of danger from diseases. The station has cooperative experiments on fertilizers for peach trees at three different places in the State. A grass garden is maintained at South Manchester with the aid of the funds supplied by the station. Work in forestry is being conducted in cooperation with this Department. Under State laws the station is charged with the inspection of fertilizers and foods. The food inspection has especially to do with articles of food, spices, condiments, etc., used by man. Many remarkable cases of adulteration have been discovered, and it has been shown that adulteration of some kinds of food is practiced to a surprising extent.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$7,500.00
State appropriation.....	12,500.00
Fees for fertilizer analyses.....	5,045.00
Farm products.....	71.00
Miscellaneous	860.84
 Total.....	 25,976.84

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publication of this station received during the past fiscal year was the Annual Report for 1896.

Annual Report, 1896, pp. XVI and 414.—This contains a brief report on the work of the year by the board of control; a financial statement for the fiscal year ending June 30, 1896; a report on adulterated food products, giving the text of the State law regulating their manufacture and sale, and the results of analyses of 947 samples, including sugars, lard, condiments, and beverages; a report on commercial fertilizers, giving the text and observance of the State fertilizer law, explanations concerning the analysis of fertilizers and the valuation of their active ingredients, description, valuation, and analyses of 492 samples of fertilizers, and a paper on the proper use of tables of analyses of fertilizers; results of experiments on the availability of fertilizer nitrogen in different substances for maize and oats; on the use of commercial fertilizers for forcing-house crops; notes on the new forcing house at the station, on the blight, burn, or scald of tomato plants, and on certain insects injurious during the season; results of extensive experiments with various substances for the prevention of potato scab; investigations on the susceptibility of various root crops to potato scab and the possibilities of preventive treatment; papers on the leaf blight of melons, on the probable winter conditions of the fungus of peach scab, on a fungous disease of tobacco, "shelling" of grapes, and miscellaneous notes on fungus and insect pests; results of fertilizer experiments with tobacco, being a final report on the fermented crops of 1895, and of further experiments during the season of 1896; summary of fertilizer experiments with tobacco for the five years 1892-96; report on the effect of fertilizers on the composition of wrapper leaf tobacco; analyses of peas and beans; observations on the growth of maize continuously on the same land for nine years; report of investigations on the proteids of lupine seeds; on the effect of minute quantities of acid on the solubility of globulin in salt solutions; and on the proteids of sunflower seed, cowpea, white potted adzuki bean, and maize kernel.

The policy and work of the Connecticut State Station during the past year have been the same as heretofore. The station is doing thorough work in a few lines of great importance to the State, and is successfully managing cooperative enterprises which keep it in close touch with the farmers.

Storrs Agricultural Experiment Station, Storrs.

DEPARTMENT OF STORRS AGRICULTURAL COLLEGE.

The work of the Connecticut Storrs Station during the past year has been along the same lines as heretofore, including investigations on the food and nutrition of domestic animals and of men, dairy bacteriology, field experiments with fertilizers and forage plants, and rotation experiments. Digestion experiments with sheep have been carried on to determine the relative amounts of digestible material obtained from different kinds of green forage. Tuberculous cows are being kept under good sanitary conditions with a view to determining the possibility of effecting a cure, and the effects of feeding their milk to calves are being tested. The investigations on the food and nutrition of man have occupied a large share of the attention of the station, and, as heretofore, have been aided by a special State appropriation, and have been carried on in cooperation with this Department. Much work has been done in perfecting a special apparatus (respiration calorimeter) for use in investigations on nutrition,

and important results have already been obtained by the use of this apparatus.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$7,500.00
State appropriation	1,800.00
Miscellaneous	656.13
Total.....	9,956.13

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publication of this station received during the past fiscal year was the Annual Report for 1896.

Annual Report, 1896, pp. 292, dgms. 2.—This embraces the report of the director on the general lines of work pursued at the station during the year; results of experiments in cream ripening and of investigations on the bacillus *Acidilactici* and other acid organisms found in American dairies; a report on a study of rations fed to milch cows in Connecticut; reports of investigations on the metabolism in the human organism, being a preliminary account of experiments on the income and outgo of the body and on the effects of different diets; reports on 9 dietary studies; results of experiments on the digestion of food by men, and on two similar experiments with an infant; papers on the digestibility of different classes of foods, the average composition of American food materials, and on the proportion of digestible nutrients in food materials; results of field experiments with fertilizers; a paper on irrigation in Connecticut, reprinted from the Office of Experiment Stations Bulletin 36; results of digestion experiments at the station with sheep; analyses of fodders and food stuffs in 1895-96, meteorological observations; and a financial report for the fiscal year ending June 30, 1896.

The Connecticut Storrs Station continues to pursue a fixed policy and to confine itself to a few lines of work. Its investigations on food and nutrition are being earnestly prosecuted and are largely concerned with the fundamental principles on which rational methods for the nutrition of domestic animals and of man must be based. The work of the past year materially contributed to the advancement of methods of investigation in this line.

DELAWARE.

The Delaware College Agricultural Experiment Station, Newark.

DEPARTMENT OF DELAWARE COLLEGE.

The work of the Delaware Station during the past year has been along the same lines as heretofore, including investigations on animal diseases, especially anthrax; methods for improving dairy herds, largely based on chemical studies of milk; horticulture; plant diseases; entomology; soil, fertilizer, and culture experiments, with special reference to the use of leguminous plants for maintaining soil fertility and promoting the dairy interests of the State. Special experiments in the breeding of varieties of sorghum with reference to the production of sugar, which have been carried on several years, have given unusually favorable results the past season.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	14.37
Miscellaneous	4.42
Total	15,018.79

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 31-34 and the Annual Reports for 1895 and 1896.

Bulletin 31, pp. 23, figs. 2.—Milk Sampling.—Brief notes on taking composite samples at creameries, on the use of composite samples for herd improvement, and on methods investigated at the station for the preservation of composite samples. A device used at the station to facilitate mixing sulphuric acid with milk in testing is described.

Bulletin 32, pp. 24.—Combating Anthrax in Delaware.—Gives a summary of the experience of the station along this line for the past five years and the details upon which the summary is based.

Bulletin 33, pp. 10.—The Increase of the San José Scale in Delaware during 1896.—Mention is made of the increase of the San José Scale during the year and some of the causes are pointed out; its life history and remedies for its repression are discussed and suggestions given regarding needed legislation.

Bulletin 34, pp. 22, figs. 4.—The Treatment of Plant Diseases in 1896.—Results of experiments for the treatment of peach rot, apple scab, potato scab, and black rot of the sweet potato.

Annual Report, 1895, pp. 246.—This includes the work of the station for the 18 months ending June 30, 1895. It gives the results of four years' investigations with the southern pea vine, including variety tests, fertilizer, feeding, soiling, and cultural experiments; results of station investigations on anthrax, history of the disease in Delaware and its probable source, attempts to control it by vaccination, and tests made to demonstrate the efficiency and safety of vaccines made at the station; notes on glanders, including temperature records for a number of tests with mallein; notes on lockjaw in horses and methods of treatment; notes on bovine tuberculosis, and on cerebro-spinal meningitis in horses; the report of the mycologist on anthrax and tuberculosis bacteriological work, bacteriological studies in contagious abortion in cows, experiments to test the germicidal power of menthol vapor and its action on the development of anthrax, experiments in spraying for fungus diseases, and notes on a leaf blight of tomatoes; a report on horticultural work giving results of fertilizer and subirrigation *vs.* surface irrigation, experiments with cauliflower in the greenhouse, comparative data and descriptive notes on 51 varieties of tomatoes, results of investigations on the effect of nitrate of soda upon tomato plants, comparative data and notes on 53 varieties of grapes, 93 of strawberries, and 10 of raspberries, notes on the effect of overflow salt water on peach trees, effect of bisulphid of carbon on the vitality of seeds and plants, results of experiments to destroy sodom apples, results of preliminary work on a study of varieties of apples for profitable culture in Delaware, and notes on a blight affecting the body of pear and apple trees; report of the entomologist giving results of work with the San José scale and other insects and on the use of various insecticides; the report of the chemist, being in part a reprint of Bulletin 27 of the station and giving results of 14

analyses of fodders, the results of investigations on paying for milk by weight and by test, notes on the use of dilute ammonia water for the preparation of ammoniacal solutions of copper carbonate, and weights of cultures of *Bacilli tuberculosis*; and the report of the meteorologist and agriculturist, giving the weather record for 1894, the results of fertilizer and cultural experiments with various field crops, and of experiments to test the value of "unhulled" vs. "hulled" timothy seed.

Report for 1896, pp. 181.—This embraces a report of the treasurer for the fiscal year ending June 30, 1896, a reprint of station Bulletin 32, the report of the mycologist giving results of extensive spraying experiments for the prevention of fruit diseases, illustrated descriptive notes on peach spot and apple rust, with a list of the species of apple rusts in the United States and of the amount of rust on different varieties of apples in the station orchard; a paper on the preparation of anthrax vaccines, with the results of tests of the same, history of the diagnosis of anthrax cases in Delaware, results of investigations on the effect of anthrax vaccines on tuberculosis, and the results of miscellaneous examinations in animal bacteriology; a report by the horticulturist on subirrigation experiments in the greenhouse with tomatoes, with comparative data and descriptive notes on 50 varieties, on tests with 71 varieties of strawberries grown in 1895 and of 62 varieties grown in 1896, with descriptive notes on the same, twenty replies by horticulturists of the State to a circular of inquiry regarding the most desirable varieties of strawberries grown in their respective localities, injury from leaf blight and strawberry weevil in 1894 and 1896, investigations on the effect of sterilizing the soil on the growth of root tubercles of cowpeas, results of investigations on the preservative power of alcoholic vapors for fresh fruits, and brief notes on early vs. late pruning of grapes; the report of the entomologist on the various insects most destructive throughout the State during the season, including a reprint of Bulletin 30 of the station with further notes on the treatment of the San José scale; report by the chemist, being in part a reprint of Bulletin 31 of the station, with the results of further work on nonsubmergent preservatives for milk, on the detection of sulpho-cyanites, and results of 8 fodder analyses; and a report by the meteorologist and agriculturist on soil and forage-crop tests at Dover, and giving the results of meteorological observations during the year.

The Delaware Station continues to be managed on the same conservative policy which has hitherto characterized its operations. The station's work, especially on animal diseases and insect pests, has been recognized of importance to the State by the enactment of laws for carrying out recommendations made by station officers as the result of their investigations. Recent changes in the State constitution provide for the appointment of officials whose duty it will be to aid the farmers of the State in securing larger practical benefits from the experimental inquiries made by the station.

FLORIDA.

Agricultural Experiment Station of Florida, Lake City.

DEPARTMENT OF FLORIDA STATE AGRICULTURAL COLLEGE.

The Florida Station continued during the past year culture experiments with forage and root crops; variety, fertilizer, and culture experiments with orchard fruits, pineapples, and vegetables; studies

of plant diseases and insect pests; and chemical investigations of the soils of the State.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State	54.95
Farm products	566.03
Total	15,620.98

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 36-38 and the Annual Reports for 1895 and 1896.

Bulletin 36, pp. 48, figs. 16.—Insects Injurious to Stored Grain and Cereal Products.—Short popular accounts and descriptions of some 17 insects, with recommendations as to remedies.

Bulletin 37, pp. 14, pls. 2.—The Pineapple at Myers.—Results are given of fertilizer and culture experiments with pineapples at the substation, together with a test of the keeping qualities of a number of varieties, and detailed directions for the construction of shelters for pineapples and the cost of material and construction. The opinions of prominent growers on the culture of pineapples are also given.

Bulletin 38, pp. 49.—Tobacco in Florida.—A revision of Bulletin 30 of the station, with additions.

Annual Report, 1895, pp. 8.—Brief outlines by the director of work carried on at the station and substations, list of bulletins issued during the year, and a financial report for the fiscal year ending June 30, 1895.

Annual Report, 1896, pp. 95.—This embraces a report by the director on the work of the year, giving results of field experiments with various crops and a financial statement for the fiscal year ending June 30, 1896; results of variety tests with vegetables; notes on the propagating house at the station, the station orchard, small fruits, and ornamentals; descriptive and life history notes on a number of plant diseases, with lists of plants affected and suggestions as to remedies; notes on the San José scale parasites and other insects; brief report by the assistant biologist on the more injurious insects of the year; report by the chemist, giving results of a number of miscellaneous analyses of fertilizers, foods, and waters; explanations of the terms used in reporting the analyses of feeding stuffs; practical suggestions in locating wells, and reports by the superintendents of the De Funiak and Myers substations on the work of the year, giving lists of trees, shrubs, and plants growing at these stations.

Progress was made during the past year in increasing the efficiency of the Florida Station. Additions were made to the equipment of different divisions of the station. The expenditures for the substations at De Funiak Springs and Fort Myers continued during the year to be a heavy drain on the resources of the station, but the recent abandonment of both these substations will, it is believed, enable the station to use its funds much more economically and with better results hereafter. For reasons beyond the control of the governing board, a change was made in the director of the station at the beginning of the present fiscal year, and an agriculturist was appointed at the same time.

GEORGIA.

Georgia Experiment Station, Experiment.

DEPARTMENT OF GEORGIA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

The work of the Georgia Station during the past year has been along the same lines as heretofore, including variety, fertilizer, and culture experiments with corn and cotton; horticultural investigations, especially on sweet potatoes and small and orchard fruits; experiments in crossing cotton; and work in dairying. Chemical studies are also made for the station at the college at Athens. The station is conducting forestry experiments in cooperation with this Department.

The income of the station was as follows:

United States appropriation	\$15,000.00
State	600.00
Individuals	2.00
Farm products	1,792.21
Miscellaneous	1,831.57
 Total	 19,225.78

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 32-35 and the Annual Report for 1896.

Bulletin 32, pp. 57, figs. 24, pls. 4.—Strawberries.—Popular directions for the general culture of strawberries, and also the local methods followed in various parts of Georgia and neighboring States. Results are given of tests of 80 varieties, with descriptive notes on a large number of the varieties tested.

Bulletin 33, pp. 31, figs. 17, pls. 4.—The Cultivated Blackberries and Dewberries.—Popular directions for the cultivation of blackberries and dewberries, results of experiments with these berries in 1896, including variety tests and a comparison of old with new plants, and descriptions of varieties tested.

Bulletin 34, pp. 29.—Corn Culture.—Results of fertilizer, culture, and variety experiments with corn for the year 1896.

Bulletin 35, pp. 29.—Cotton Culture.—Results of fertilizer, culture, and variety experiments with cotton for 1896.

Annual Report, 1896, pp. 8.—A brief report on the work of the year, personnel of the station, publications issued, and a financial statement for the fiscal year ending June 30, 1896.

The policy and work of the Georgia Station continue to be the same as in past years. The affairs of the station are conducted in an orderly manner; it is giving the farmers of the State considerable useful information, and is vigilant to protect their interests as far as practicable.

IDAHO.

Agricultural Experiment Station of the University of Idaho, Moscow.

DEPARTMENT OF THE UNIVERSITY OF IDAHO.

The work of the Idaho Station during the past year included field experiments with cereals, forage crops, and vegetables; chemical studies of soils, peas, potatoes, fruits, and crops grown with and with-

out irrigation; botanical and forestry investigations. The three substations maintained since the organization of the station have been discontinued. Some preliminary work has been done in preparing for experimental purposes a tract of about 85 acres of land in the vicinity of the station offices, donated by citizens of Moscow. The director, irrigation engineer, and farm superintendent resigned during the year. The president of the university has been made director of the station, and a horticulturist and farm superintendent has been appointed. Changes in the governing board of the station have also occurred.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Individuals	3,000.00
Farm products	1,109.74
Total	19,109.74

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publication of this station received during the past fiscal year was the Annual Report for 1895.

Annual Report, 1895, pp. 5.—A report by the director on the progress of work at the station and a financial statement for the fiscal year ending June 30, 1895.

The Idaho Station has been mainly engaged during the past year in reorganizing its affairs. It is hoped that by the abandonment of the substations and by the changes made in the management of the station its efficiency will be greatly increased. Meanwhile the station has fallen behind in its publications, its finances have been in an unsatisfactory condition, and its operations have been very largely of a superficial character. Its future success depends on the establishment and maintenance of a consistent and economical policy in the conduct of its affairs.

ILLINOIS.

Agricultural Experiment Station of the University of Illinois, Urbana.

DEPARTMENT OF THE UNIVERSITY OF ILLINOIS.

The work of the Illinois Station during the past year has included field experiments with corn, oats, and forage crops; variety, culture, and other experiments with orchard and small fruits and vegetables; studies of bacterial and fungus diseases of plants; entomological investigations, especially on the San José scale and shade and forest tree insects, and chemical studies, especially of the nitrogen content of corn. The station continues to make investigations on Indian corn a leading feature of its work. Special experiments in the inoculation of leguminous plants with bacterial cultures (nitragin) have been made in pots and in the field. The station has kept considerable live stock and managed a dairy on a commercial basis, but the amount of experimental work connected with this enterprise hardly justifies its continuance. Soil investigations in southern Illinois have been continued. The station has coöperated with this Department in experiments with sugar beets. The burning of the chemical laboratory about a year ago caused considerable loss of apparatus and records.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Individuals	166.28
Fees	140.00
Farm products	2,665.37
Miscellaneous	213.30
Total	18,184.95

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 44-48 and the Annual Report for 1895-96.

Bulletin 44, pp. 88, figs. 61.—Insects Injurious to the Seed and Root of Indian Corn.—This bulletin is largely an abstract of the more economic parts of the Illinois State Entomological Report for 1895.

Bulletin 45, pp. 52.—Varieties of Apples.—A brief history of the university orchard since 1869; remarks upon pests, soil treatment, life of trees, and identity of varieties; descriptions of 18 varieties which have given most promise of usefulness, and of 550 varieties which have fruited on the station farm, and a list of 304 varieties which were planted but did not live to bear fruit.

Bulletin 46, pp. 24.—Experiments with Corn and Crimson Clover.—*Improvement of Retentive Clays.*—*The Importance of the Physiological Requirements of the Animal Body.*—This bulletin contains results of culture and variety experiments with corn and crimson clover; successful drainage experiments with the retentive clay or "hardpan" lands of southern Illinois, and the results of the attempts to grow calves without coarse foods.

Bulletin 47, pp. 60, pls. 5.—Broom Corn Smut.—A report of extended investigations on the nature and life history of broom-corn smut and on infection and germination experiments, together with a short bibliography and suggestions as to methods of prevention.

Bulletin 48, pp. 16, figs. 2.—The San José Scale in Illinois.—A popular bulletin on the history of the pest in Illinois, its nature and treatment.

Annual Report, 1895-96, pp. 16.—This embraces a general account of the transactions of the governing board of the station, a statement of the experimental work, and the report of the treasurer for the fiscal year ending June 30, 1896.

The Illinois Station continues to do a considerable amount of useful work. Its main investigations are concentrated on comparatively few lines, and these are being steadily developed. In some respects, however, there needs to be a more definite differentiation of the work of the agricultural college and experiment station in order that the latter may be relieved of the burden of enterprises involving mainly ordinary farm operations and commercial transactions.

INDIANA.

Agricultural Experiment Station of Indiana, Lafayette.

DEPARTMENT OF PURDUE UNIVERSITY.

The work of the Indiana Station during the past year has been mainly along the same lines as heretofore, including feeding experiments with calves, pigs, and poultry; field experiments with corn,

wheat, oats, and forage plants, with fertilizers, and on rotation of crops and methods of tillage; horticultural investigations, especially testing of varieties; soil investigations; chemical studies of sugar beets, phosphate slag, etc.; pot experiments with roses grown in different soils and with different fertilizers; studies on corn smut and potato scab; and investigations on animal diseases. The laboratory and greenhouse facilities for investigations on the physiology and pathology of plants have been improved. Noteworthy investigations on the physiology of milk secretion and the udders of cows are in progress. The chemist of the station continues to act as State chemist and to make fertilizer analyses with funds furnished by the State. The station has cooperated with this Department in experiments in forestry and with sugar beets. Cooperative experiments with different soils and fertilizers have been carried on in a number of localities.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	2,065.49
Total	17,065.49

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 61-64 and the Annual Report for 1896.

Bulletin 61, pp. 12.—Field Experiments with Wheat.—Results of culture and variety investigations.

Bulletin 62, pp. 24, figs. 11.—The Udder of the Cow.—A popular treatise on the construction and physiology of the udder of the cow, illustrated by numerous original drawings and containing a large amount of comparative data from a number of different herds on the milk yield of the front half and hind half of the udder, yields from different types of udders, and from the right and left glands, and on the results of milking one teat at a time.

Bulletin 63, pp. 18, pls. 2.—Bovine Tuberculosis in Indiana.—A popular bulletin on the extent and nature of bovine tuberculosis in the State, with directions for the use of tuberculin for diagnosing this disease.

Bulletin 64, pp. 16.—Field Experiments with Corn, Oats, and Forage Plants.—A report on variety and culture investigations.

Annual Report, 1896, pp. 61, figs. 6.—Reports by the director and heads of departments on work of the year, giving results of culture experiments and variety tests with oats and corn, the use of dendrolene as an insecticide, close root-pruning of trees, investigations on punctures of ripe grapes as related to bees, together with plans of various station buildings, lists of acknowledgments and of bulletins issued, and a financial statement for the fiscal year ending June 30, 1896.

The Indiana Station is developing its work along lines of great usefulness to the State, and some of its investigations have much scientific as well as practical interest. It is believed that by a sharper differentiation of the college and station as regards farm operations the efficiency of the station would be still further advanced.

IOWA.

Agricultural Experiment Station, Ames.

DEPARTMENT OF IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

The work of the Iowa Station during the past year has been mainly along the same lines as heretofore, including feeding experiments with pigs, sheep, steers, calves, and dairy cows; breeding experiments with pigs; culture and variety experiments with cereals, sugar beets, grasses, and other forage crops; studies of soil moisture; chemical and botanical studies of grasses; entomological investigations, with special reference to insects feeding on grasses; variety, culture, and crossing experiments with fruits, roses, and other horticultural plants; and investigations of diseases of sheep. The work on problems connected with the feeding of animals is being extended and strengthened. Results of much practical interest have been obtained from experiments in feeding and marketing lambs. The field work is also being enlarged in the direction of a greater number of plant experiments. Experiments with sugar beets and grasses are being conducted in cooperation with this Department.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	2,298.41
Miscellaneous	79.24
Total	17,377.65

A report of the receipts and expenditures of the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 33 and 34.

Bulletin 33, pp. 83, figs. 26.—Lamb Feeding.—Steer and Heifer Beef II.—Old Process v. New Process Linseed Meal.—Notes on Injurious Insects.—Fresh Cow v. Stripper Butter.—Embraces results of feeding experiments with 114 lambs, representing 11 breeds, and of slaughter and block tests of the same; results of feeding experiments for beef with 5 steers and 5 spayed and 3 open heifers and of slaughter and block tests; experiments to test the value of old versus new process oil meal; illustrative, descriptive, remedial, and life history notes on 7 injurious insects; and results of investigations on the effect of period of lactation on the quality of butter.

Bulletin 34, pp. 102, figs. 3, pls. 22.—Studies of the Life Histories of Grass-Feeding Jassidæ.—Weeds of the Mustard Family.—Notes on Dairy Bacteriology.—Home Propagation.—Crop Notes, 1896.—Embraces results of investigations on the life history, range of food plants, and collection and identification of a large number of grass-feeding Jassidæ; notes on the identification and distribution of a number of troublesome weeds, with methods of eradication; notes on dairy bacteriological work at the station; methods of home propagation of seeds, bulbs, tubers, corms, etc., and crop notes for the season of 1896.

The Iowa Station continues to pursue an active and consistent policy and to keep in close touch with the farmers of the State. The relations of the college and the station are especially to be commended in

that in the division of salaries and the expenditures for the maintenance of the farm and creamery the station is charged with only a fair share of the expense growing out of its use of these facilities for experimental research, without bearing the burden of the general management of these college enterprises. Improvements recently made in the buildings and water system of the college with the aid of State funds will be of material service to the station.

KANSAS.

Kansas Agricultural Experiment Station, Manhattan.

DEPARTMENT OF KANSAS STATE AGRICULTURAL COLLEGE.

The work of the Kansas Station during the past year was mainly along the same lines as heretofore, including feeding experiments with steers and pigs; variety and culture experiments with wheat, oats, Kafir corn, grasses, forage plants, etc., and on rotation of crops; fertilizer experiments, chemical studies of corn, Kafir corn, etc.; studies of soil moisture; entomological investigations, especially of insects injurious to fruits and alfalfa; studies of animal diseases, especially tuberculosis, "corn-stalk" diseases, and poisoning from weeds; investigations of weeds and plant diseases, especially the smuts of cereals, corn, and sorghum; variety tests and other experiments in horticulture and forestry. Irrigation experiments in coöperation with the State Board of Irrigation were conducted at Oakley, but this substation has since been abandoned. Experiments in forestry and with sugar beets are being conducted in coöperation with the Department.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	<u>2,045.78</u>
Total	17,045.78

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 58-64 and the Annual Report for 1896.

Bulletin 58, pp. 24.—Corn Stalk Disease of Cattle: Preliminary Bulletin.—A report on the prevalence of this disease, its extent, geological distribution within the State, and of the several outbreaks; the results of feeding corn smut and stalks affected with the Burrill bacterial corn disease to cattle; and the means to be employed in the prevention of the disease.

Bulletin 59, pp. 17.—Experiments with Wheat.—This gives the results of investigations on growing wheat continuously without manure; early and late plowing; subsoiling vs. surface plowing; time, rate, and methods of seeding; grading seed wheat; effect of pasturing wheat; wheat in rotation; and results of a test of 47 varieties.

Bulletin 60, pp. 40.—Steer Feeding Experiments.—A report on a feeding experiment with 20 steers to further test the relative merits of the balanced ration, ground corn, ear corn, and feeding in the open as compared with barn feeding.

Bulletin 61, pp. 22.—(I) Kafir Corn, Corn, and Soja Bean Meal for Pigs; (II) Kafir Corn and Corn Meal for Cattle.—Results of feeding experiments with 12 pigs for 125 days to test the value of Kafir corn meal and soja bean meal as food for hogs in comparison with corn

meal; and of a feeding experiment during the same period with 3 heifers to compare Kafir corn meal with corn meal as a fattening feed for cattle.

Bulletin 62, pp. 43, pls. 10.—Corn Smut.—This bulletin records the observations and experiments made during the last three years upon the life history of the corn smut and upon conditions favoring its spread. A general description of smut and its life history is given, including a description of spores, germination, methods of culture, and germination in various nutrient solutions. Results are given of attempts made to ascertain the relative susceptibility of different varieties of corn to the attacks of smut, to determine the relation between the amount of smut and the age of corn; and notes on infection experiments with corn. The synonymy of the fungus and an extensive bibliography are appended. Notes are also given on the occurrence of head smut of sorghum (*Ustilago reiliana*) on corn.

Bulletin 63, pp. 14.—Experiments with Oats.—Results are given of plowing and seeding experiments, tests of 51 varieties, and of a test to ascertain the effect of a change in soils on the percentage of smut in oats.

Bulletin 64, pp. 20.—Experiments with Corn.—A report is given of the following series of experiments carried out during the past season: Time of planting; amount of cultivation; method of culture; sub-soiling *vs.* surface plowing; butt, middle, and tip kernels for seed; fall and spring plowing for corn; early, medium, and late varieties; and a test of 48 varieties.

Annual Report for 1896, pp. 28.—A report of the council outlining the bulletins published and the general work of the year; notes on the station personnel; list of publications issued since the organization of the station; summary of inventories by departments; list of donations; and a report of the treasurer for the fiscal year ending June 30, 1896.

The experimental investigations of the Kansas Station were conducted during the past year in an orderly and thorough manner along lines of great practical usefulness, and its financial and other business was carried on strictly within the provisions of the law. The results of its work compare very favorably with those of other stations having like resources. The college, of which the station is a department, enjoyed a year of great prosperity, having a larger number of students and better facilities for instruction than at any previous time in its history. Radical action on the part of the State legislature and the governing board has, however, brought about a reorganization of both college and station, taking effect with the beginning of the current fiscal year, which has excited so great an agitation among the friends and patrons of the institution and the people generally throughout the State as to make the future of the institution full of uncertainties. The changes which have taken place apparently have their foundation in the peculiar political conditions of the State and relate to questions of general policy which in no way affect the character or professional standing of the officers of the institution. In March, 1897, the State legislature passed the following act:

AN ACT to provide for the government of the Kansas State Agricultural College.

Be it enacted by the legislature of the State of Kansas—

SECTION 1. The government of the college is vested in a board of seven regents, all of whom shall be appointed by the governor and confirmed by the senate and whose term of office shall be four years. Five of said regents shall be appointed on or before the first day of April, 1897, one of whom shall hold his office until the

first day of April, 1899, and four of whom shall hold their office until the first day of April, 1901; two shall be appointed on or before the first day of April, 1898, to hold office until the first day of April, 1899, and on or before the first day of April, 1899, and every four years thereafter previous to the first day of April, three regents, and after the first day of April, 1897, four regents, shall be appointed by the governor and confirmed by the senate for a term of four years each, their terms expiring on the first day of April.

But nothing in this act shall be construed so as to restrain the governor from appointing regents before the expiration of the regular legislative session.

Whenever any vacancy shall occur in the said board of regents, it shall be the duty of the governor at once to appoint some suitable person to fill the vacancy. And when any appointment is made while the legislature is not in session, the appointee shall hold his office until action is taken upon his appointment by the senate; and if the senate fails to take action thereon, his term of office shall expire at the close of the session and the governor shall fill the vacancy as in other cases.

SEC. 2. No one connected with the college as professor, tutor, teacher, or employee shall be a regent.

SEC. 3. The regents shall elect a president, who shall be the chief officer of the college and the head of each department thereof, and the secretary of the board of regents, and whose duties and powers, otherwise than as prescribed in this act, shall be prescribed by the board of regents.

SEC. 4. All acts and parts of acts in conflict with the provisions of this act are hereby repealed.

SEC. 5. This act shall take effect and be in force from and after its publication in the *Topeka State Journal*.

The first effect of this act was to cause an immediate reorganization of the governing board and to prevent the president of the college from continuing to serve as a member of the board. The new board met in April and passed the following resolution: "*Resolved*, That the term 'school year' as employed in the act entitled 'An act, etc.,' shall begin July first of each year and end June 30th of the following year, and that the term of employment of all present employees shall expire June 30th, 1897." Inasmuch as the officers of the institution had previously held their positions on terms which practically insured permanency of tenure during good behavior and efficiency, the passage of the aforesaid resolution evinced a determination on the part of the new board to make a reorganization of the faculty and staff of the college and station on a new basis. Its effect was, in short, to bring the Kansas Agricultural College as it had previously been known to an end on June 30, 1897, after which date a new institution bearing the same name but having a new faculty and policy of management would begin its career. The work of reorganization has proceeded as rapidly as circumstances would permit. As far as reported to this office, out of fourteen persons constituting the station staff, whose names were published in our official organization list (Bulletin 39) February, 1897, six are now on the staff, three of the officers retained being assistants. Our examination of the expenditures, publications, and work of the station has not revealed any good and sufficient reasons for this radical reorganization. Experience in station management yearly brings increasing evidence that permanency in policy, personnel, and work is essential to the successful conduct of experimental inquiries in behalf of agriculture. Changes due to the ordinary vicissitudes of human life and to conservative efforts to increase the efficiency of the station will at best be all too frequent. It must be a very extraordinary set of circumstances which can produce such a state of things as to justify an entire reorganization of a station staff during a single year. Proved misbehavior or inefficiency ought to secure the speedy removal of a station officer at any time, but in the absence of such causes for removal, he ought to feel entirely secure in his position. On the old basis the Kansas Station made a good

record. Now the station must be put in the category which includes those in whose management violent changes have unfavorably affected the morale of the workers and caused a structural weakness in their operations.

KENTUCKY.

Kentucky Agricultural Experiment Station, Lexington.

DEPARTMENT OF THE AGRICULTURAL AND MECHANICAL COLLEGE OF KENTUCKY.

The work of the Kentucky Station has continued during the past year mainly along the same lines as heretofore, including field experiments with cereals, tobacco, hemp, potatoes, etc.; variety tests of grasses and other forage plants; studies of methods of soil analysis; analysis and inspection of commercial fertilizers; horticultural investigations; studies of fungus diseases of plants; entomological investigations; dairying, especially studies of the variation in butter fat of the milk of cows. The station has undertaken field and chemical investigations on sugar beets in coöperation with this Department. The analysis and inspection of commercial fertilizers conducted under State laws continue to yield a considerable net revenue, which is devoted to agricultural investigations.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Fees for fertilizer analysis	3,240.00
Farm products	1,280.43
Miscellaneous	3,232.84
Total	22,753.27

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 64-68.

Bulletin 64, pp. 15.—Analyses of Commercial Fertilizers.—Tabulated analyses and valuations of 127 samples of fertilizers, accompanied by explanatory notes.

Bulletin 65, pp. 10.—Analyses of Commercial Fertilizers.—Tabulated analyses of 52 samples of fertilizers.

Bulletin 66, pp. 39, pls. 4.—Tobacco.—Results of fertilizer tests; extended notes on Northern and Southern tobacco worms, including the results of experiments in feeding the worms varying quantities of paris green, and notes on the insect parasites attacking them; further notes on several other tobacco insects and on two imperfectly known diseases of tobacco.

Bulletin 67, pp. 67, figs. 3.—The San José Scale.—A popular bulletin on this insect, giving its history and life history, descriptive notes, remedies, etc.

Bulletin 68, pp. 13.—Analyses of Commercial Fertilizers.—Explanatory notes and tabulated analyses of 98 samples of fertilizers.

The Kentucky Station continues to pursue a consistent and permanent policy. It is gradually increasing its facilities and developing its operations along lines of much practical importance to the agriculture of the State.

LOUISIANA.

- No. 1. Sugar Experiment Station, Audubon Park, New Orleans.
 No. 2. State Experiment Station, Baton Rouge.
 No. 3. North Louisiana Experiment Station, Calhoun.

DEPARTMENT OF LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE.

The three Louisiana stations have continued their work during the past year mainly in the same lines as heretofore, some of the principal lines of investigation being as follows:

Sugar Station.—Investigations on the breeding, fertilizing, culture, and improvement of sugar cane and the manufacture of cane sugar; chemical, microscopical, and biological studies of sugar cane and its products; field experiments with fiber plants, alfalfa, corn, sorghum, velvet bean, and other forage plants; chemical and other studies of soils; horticultural investigations, especially on citrus fruits; drainage and irrigation experiments.

State Station.—Field experiments with tobacco, cotton (especially Egyptian varieties), corn, and other crops; horticultural investigations, including greenhouse experiments; investigations in entomology and veterinary science; botanical studies, especially on the root tubercles of leguminous plants; feeding experiments.

North Louisiana Station.—Field experiments with tobacco, corn, and other crops; horticultural experiments; feeding experiments; and dairying.

Work in connection with the State geological survey is still continued by the station at New Orleans under State laws. Analyses of commercial fertilizers and paris green are made by the State Station for the State commissioner of agriculture. Interesting experiments have been made in the importation of Northern cattle and their treatment to render them immune against Southern cattle fever.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000.00
State appropriation.....	18,000.00
Individuals (Sugar Planters' Association).....	2,211.88
Fees for analyses of fertilizers and paris green.....	856.18
Farm products.....	832.04
Miscellaneous.....	216.53
 Total.....	 37,116.63

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 41-46, Report on Geology and Agriculture, Part III, and the Annual Report for 1896.

Bulletin 41, pp. 27.—Tobacco: Yellow Leaf and Cigar Varieties.—Includes a record of fertilizer and variety experiments at the North Louisiana Station at Calhoun with cigar and bright leaf tobaccos and at the State Station at Baton Rouge with cigar tobaccos; results of a test of three methods of curing; and directions for harvesting, stripping, and sorting, with a brief description of the station tobacco barn.

Bulletin 42, pp. 40.—Horticulture: Results of the year 1895.—General remarks on truck growing in the State and tabulated data and notes on vegetables and fruits grown at the stations.

Bulletin 43, pp. 20.—Bovine Tuberculosis in North Louisiana.—An account is given of the unexpected appearance of bovine tuberculosis in the station herd at Calhoun and of the tuberculin tests made; temperature records and data regarding the yield and composition of milk before and after injection are given for 22 animals.

Bulletin 44, pp. 28, fig. 1.—Charbon or Anthrax.—A popular bulletin giving the history, character, general symptoms in different domestic animals, treatment, and sanitary and hygienic measures; notes are also given upon the serious outbreak of the disease in the State in the spring of 1895.

Bulletin 45, pp. 28.—Analyses of Commercial Fertilizers and Paris Green.—Includes the text of the State fertilizer law, a discussion of the character of fertilizers sold in Southern markets and those adapted to Louisiana soils, a list of guaranteed analyses, notes on valuation, and tabulated analyses of 96 samples of fertilizers. The text of the law providing for the inspection of paris green is also given and tabulated analyses of 8 samples.

Bulletin 46, pp. 12, fig. 1.—Leguminous Root Tuberclles.—Results of experiments to determine the influence on leguminous root tubercles of deep and shallow planting, the depths to which nitrifying organisms penetrate, and the effect of transferring the organisms from one host to another.

Geology and Agriculture, Part III, pp. 94.—A Preliminary Report upon the Florida Parishes of East Louisiana and the Bluff, Prairie, and Hill Lands of Southwest Louisiana.—This deals with the greater part of the State of Louisiana south of the 31st degree. Different chapters are devoted to descriptions of area, including the geography and history, topography and drainage, the mounds, natural ponds, geological history, brief history of the La Fayette and the Columbia formations, soils, economic products, including mineral and vegetable products, climate, the five islands, some geological sections (pine hills, pine fields, prairies, and bluffs), with an appendix on the principal plants of economic value in this region. A brief description is also given of the detached and limited areas known as the "Islands" of Orange, Petite Anse, Grand Cote, Cote Blanche, and Belle Isle.

Annual Report, 1896, pp. 12.—Report by the director on the work of the stations at Audubon Park, New Orleans, Baton Rouge, and Calhoun during the year, with lists of station publications and a financial statement for the fiscal year ending June 30, 1896.

The Louisiana Stations have been managed during the past year on the same general policy as heretofore. Their work was actively and successfully prosecuted and they received generous financial aid from the State and the Sugar Planters' Association.

MAINE.

Maine Agricultural Experiment Station, Orono.

DEPARTMENT OF THE UNIVERSITY OF MAINE.

The work of the Maine Station during the past year has been principally in the same lines as heretofore, including investigations on the food and nutrition of man and domestic animals, box and field experiments with fertilizers, horticultural experiments, botanical and entomological investigations, and work in veterinary science and practice. Feeding experiments have been made with cows and digestion experiments with sheep. Box experiments on the availability of phosphoric

acid have been continued. In horticulture, studies in plant breeding have constituted the most important line of inquiry. Greenhouse experiments have been made with tomatoes, fruits, vegetables, and ornamentals. Cooperative experiments in horticulture have also been conducted, especially in Aroostook County. In connection with investigations on tuberculosis, the effects of careful treatment under proper hygienic conditions are being tested. The work on the food and nutrition of man has been conducted in cooperation with this Department and has included especially studies on the digestibility of bread made from different kinds of flour and investigations with the bomb calorimeter. Under State laws the station has the inspection of fertilizers, creamery glassware, feeding stuffs, and seeds. The laws relating to feeding stuffs and seeds have gone into effect this fall.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Fees for fertilizer analyses	1,970.50
Farm products	866.47
Miscellaneous	1,339.79
 Total	 19,176.76

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 30-32 and the Annual Report for 1895.

Bulletin 30, pp. 32.—Fertilizer Inspection.—Notes on valuation and tabulated analyses of 142 samples of fertilizers.

Bulletin 31, pp. 8, figs. 2.—A Modification of the Babcock Method.—A modification of the Babcock method of milk testing is discussed and a number of comparative tests employing the method are reported.

Bulletin 32, pp. 8, figs. 3.—Three Troublesome Weeds.—Illustrated and descriptive notes on the orange hawkweed, wild carrot, and buffalo burr, with suggestions as to means of eradication.

Annual Report, 1895, pp. 174, figs. 18, pls. 5.—Reports by the director and heads of departments on the work of the year, including the following subjects: Analyses of butter, imitation butter, and miscellaneous products; field experiments with fertilizers; notes on the profitable amount of seed per acre for corn; digestion experiments with sheep; feeding experiments with milch cows; notes on variety tests of potatoes and corn; historical notes on tomatoes, with the results of forcing experiments in winter; notes on the field culture of tomatoes, on small fruits, and on plant breeding; notes on plant diseases and insects injurious during the year, with more detailed accounts of those new to the State or considered especially injurious; the use of tuberculin as a diagnostic agent; reprints of bulletins issued in 1894, and a financial statement for the fiscal year ending June 30, 1895.

The present director of the Maine Station began his term of service July 1, 1897, and the past fiscal year has therefore witnessed a partial reorganization of the station. The station staff has been increased by the addition of two chemists, and the facilities for investigation have been somewhat enlarged. The management of the farm connected with the university has been consolidated under the direction of the station. This has, however, been done under such conditions that farm expenditures for college purposes will not be charged against the station funds. "The station funds will be used, as in the past, only to defray the cost of experiments." The changes in station man-

agement have not affected the general character of the investigations. The station continues to perform efficient service and to concentrate its work on a few important subjects.

MARYLAND.

Maryland Agricultural Experiment Station, College Park.

DEPARTMENT OF MARYLAND AGRICULTURAL COLLEGE.

The work of the Maryland Station during the past year has been mainly along the same lines as heretofore, including chemical investigations, especially of feeding stuffs; feeding and digestion experiments with milch cows, pigs, and horses; breeding experiments with cows; field experiments with corn, tobacco, lime, and fertilizers; horticultural experiments; entomological investigations, and work in dairying. The State fertilizer inspection continues to be made by the college with which the station is connected and the results are published by the station. The equipment of the station for experiments in pig feeding has been materially enlarged.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	1,194.04
Miscellaneous	81.19
Total	16,275.23

A report of the receipts and expenditures for the United States fund has been rendered, in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 38-46 and the Annual Reports for 1895 and 1896.

Bulletin 38, pp. 8.—Potato Experiments.—Results of fertilizer, culture, variety, and spraying experiments.

Bulletin 39, folio.—Spray Calendar.—Reprint of Bulletin 114 of New York Cornell Station.

Bulletin 40, pp. 52.—Composition of Commercial Fertilizers Sold in the State.—Includes a schedule of trade values of fertilizing materials, a list of fertilizers licensed for sale in Maryland for the year ending January 31, 1897, and tabulated analyses and valuations of 390 samples of fertilizers.

Bulletin 41, pp. 15.—Test of Methods of Preparing and Feeding Corn Fodder.—Results of feeding experiments with cattle to determine the feeding value and digestibility of shredded corn fodder prepared in different ways and the digestibility of bran. Notes are also given on the comparative value of cotton-seed hulls and other feeding stuffs.

Bulletin 42, pp. 15, figs. 8.—Maryland Trees and Nursery-Stock Law and Other Information of Special Interest to Nurserymen and Fruit Growers.—Text of the State tree and nursery-stock law, with comments; notes on the present condition of nurseries in the State; descriptions of a new peach disease; the present status of the San José scale in the State, with methods of detection; and notes on peach yellows and peach rosette.

Bulletin 43, pp. 22, fig. 1.—Report upon the Value of a New Corn Product.—The new corn product consists of corn stalks ground into meal after the pith has been removed. Results are reported of a number of feeding and digestion experiments on 4 steers with this material.

Bulletin 44, pp. 20.—The Soil of the Hagerstown Valley.—The progress made in the classification and study of the soils of Maryland is explained and mechanical analyses are given of soils and subsoils of 7 typical corn lands, 8 wheat lands, and 6 grass lands of the limestone area of this region, 5 samples of subsoil from the Hudson River shales, and 4 from the peach lands on Cambrian sandstones.

Bulletin 45, pp. 50.—Composition of Commercial Fertilizers.—A schedule of trade values of fertilizing materials; a list of fertilizers licensed for sale in Maryland for the year ending January 31, 1897, and tabulated analyses and valuations of 416 samples of fertilizers.

Bulletin 46, pp. 16, fig. 1.—Tabulated results of cultivation, distance, and fertilizer experiments with corn and potatoes, and of variety tests of potatoes.*

Annual Report, 1895, pp. 22, pls. 3.—Reports by director and heads of departments outlining the work of the year, meteorological summary for 1895, and a financial statement for the fiscal year ending June 30, 1895.

Annual Report, 1896, pp. 16.—Report of the director and heads of departments on the work of the year, meteorological summary for 1896, and a financial statement for the fiscal year ending June 30, 1896.

The work of the Maryland Station has been actively prosecuted during the past year, and the investigations in the feeding and digestion of animals and on entomology have been considerably developed and strengthened. The station needs to do more for the horticultural interests of the State, and it is hoped that State aid may be secured for the carrying on of additional and more thorough investigations in horticulture and on the diseases of plants.

MASSACHUSETTS.

Hatch Experiment Station of the Massachusetts Agricultural College,
Amherst.

DEPARTMENT OF THE MASSACHUSETTS AGRICULTURAL COLLEGE.

The work of the Massachusetts Station during the past year has been mainly along the same lines as heretofore, including the analysis and inspection of commercial fertilizers; field experiments with fertilizers; variety, fertilizer, and culture experiments with corn, potatoes, forage plants, etc.; feeding and digestion experiments and dairy studies; horticultural experiments, largely tests of seedling and other varieties; entomological investigations; studies of plant diseases and nematodes, and meteorological observations. Experiments with cows have been made to determine the comparative digestibility of hay from salt-marsh grasses and the effect on milk and butter. Important laboratory studies on the carbohydrates of feeding stuffs are in progress. Experiments have been made on the effects of electricity and of colored light on greenhouse plants, and with gases for destroying spores on such plants. The entomologist continues to render important services in connection with the work of the State Gypsy Moth Commission. Feeding experiments have been carried on with poultry, with a special comparison of animal and vegetable foods. Experiments in subsoiling have covered a number of years. A beginning has been made of studies on the relations of climate to the growth of corn. A State law providing \$1,200 a year for an inspection of feeding stuffs, under the direction of the station, went into effect October 1, 1897. The chemical laboratory (fig. 1) has been enlarged

FIG. 1.—CHEMICAL LABORATORY OF THE MASSACHUSETTS HATCH EXPERIMENT STATION.



and improved, at an expense of \$7,000. The greenhouse facilities of the station have been materially enlarged.

The income of the station during the past year was as follows:

United States appropriation	\$15,000.00
State appropriations	10,000.00
Fees for fertilizer analyses	4,087.75
Farm products	1,934.15
Miscellaneous	2,065.11
 Total	 33,087.01

A report of the receipts and expenditures for the United States fund has been rendered, in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the fiscal year were Bulletins 40-44, Meteorological Bulletins 90-101, and the Annual Report for 1896.

Bulletin 40, pp. 19.—Analyses of Fertilizers.—A schedule of trade values, with tabulated analyses of 189 samples of fertilizing materials.

Bulletin 41, pp. 27.—On the Use of Tuberculin.—Article on this subject translated from the Deutschen Zeitschrift für Thiermedicin, 22 (1896).

Bulletin 42, pp. 31.—Analyses of Fertilizers.—New laws for the regulation of the trade in commercial fertilizers in Massachusetts, text of the State fertilizer law, and tabulated analyses of 153 samples of fertilizing material.

Bulletin 43, pp. 32, figs. 2, pls. 4.—Electro-Germination.—Results of station investigation on this subject, with a description of the apparatus and methods employed, and a brief review of the literature relating to the application of electricity to plant life.

Bulletin 44, pp. 48.—Variety Tests of Fruit.—Tests of Vegetable Seeds.—Results of variety tests of orchard and small fruits, with descriptive notes on a number of the varieties tested, together with the results of germination tests of a large number of garden seeds from different sources.

Meteorological Bulletins, 90-101, pp. 4 each.—Notes on the weather and monthly summaries of meteorological observations for the year ending May 31, 1897, with an annual summary for the year 1896 in the December number.

Annual Report, 1896, pp. 254.—Reports of director and heads of departments on the work of the year, embracing the following subjects: Variety, fertilizer, and cultural experiments with a large number of farm crops; trials of hay caps; feeding experiments with poultry for egg production; report of studies on a large number of plant diseases; remarks relative to the carbohydrates of agricultural plants and seeds; technical investigations on the distribution of galactan and on the phloroglucin method for the estimation of pentosans; feeding experiments with pigs; digestion experiments with sheep; compiled tables of analyses of fodder articles and dairy products and of digestion coefficients of American feeding stuffs; field experiments to study the effect of raising leguminous crops in rotation with grain crops on the nitrogen resources of the soil; experiments with "nitragin" for the cultivation of leguminous crops; observations with leguminous crops at Amherst; tests of mixed annual forage crops vs. clovers; experiments to study the economy of using natural phosphates in place of acid phosphates and to ascertain the influence of different mixtures of chemical fertilizers on the character and yield of garden

crops; report on inspection of commercial fertilizers; text of the State fertilizer law; notes on basic phosphatic slag as a fertilizer, on the action of the chlorids of potassium and sodium on the lime resources of the soil, and on the effect of chlorid of potassium on sulphate of ammonium in mixed fertilizers; and compilations of analyses of mineral substances, fruits, garden crops, and insecticides.

The Massachusetts Station has enjoyed a prosperous year. The State has continued its liberal support and the facilities for investigation have been materially improved. In some lines the work has been extended and in others promising investigations have been undertaken.

MICHIGAN.

Experiment Station of Michigan Agricultural College, Agricultural College.

DEPARTMENT OF MICHIGAN AGRICULTURAL COLLEGE.

The work of the Michigan Station during the past year has been mainly along the same lines as heretofore, including field experiments with wheat, forage plants, and other crops; feeding experiments, especially with dairy cattle, lambs, and pigs; horticultural experiments; fertilizer analysis and inspection; chemical studies of wheat, forage plants, etc.; entomological investigations; botanical and bacteriological studies; and investigations on animal diseases, particularly tuberculosis.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Fees for fertilizer inspection	1,220.00
Farm products	282.41
Miscellaneous	3,081.64
Total	19,584.05

A report of the receipts and expenditures for the United States fund has been rendered, in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 133-144 and the Annual Report for 1895.

Bulletin 133, pp. 13.—Tuberculosis.—A popular bulletin, giving a brief historical sketch of the disease, methods of dissemination of the virus, the symptoms of the disease and its diagnosis by clinical and microscopical examinations and by the tuberculin test, results of experiments with tuberculin, and an outline of proposed experimental work at the station along these lines.

Bulletin 134, pp. 28, figs. 6.—A Preliminary Bulletin on the Pasteurization of Milk.—A popular bulletin on milk pasteurization, with the results of two experiments on the keeping quality of milk sterilized commercially by the De Laval apparatus.

Bulletin 135, pp. 15.—Fertilizer Analyses.—Explanatory notes, text of the State fertilizer law, and tabulated analyses of 60 samples of fertilizers.

Bulletin 136, pp. 22.—Fattening Lambs.—A Comparison of Fodders.—Results of a feeding test made with 100 grade Shropshire lambs to test the value of alfalfa, millet hay, oat straw, cornstalks, and bean straw as a whole or partial substitute for clover hay.

Bulletin 137, pp. 6.—Feeding Corn Smut.—Results of experiments in feeding large quantities of corn smut, in addition to other rations, to four cows.

Bulletin 138, pp. 10.—Pig Feeding.—A report is given of tests made to compare the relative gain of pigs before and after weaning, and to compare the gain made by pigs and calves when fed under similar conditions.

Bulletin 139, pp. 37, figs. 25.—Bacteria: What They Are and What They Do.—A general treatise on the subject, including a glossary.

Bulletin 140, pp. 12, figs. 4.—Ropiness in Milk.—Results of investigations of two epidemics ofropy milk in dairy herds, with a technical description of the microorganism causing ropiness.

Bulletin 141, pp. 30, figs. 2.—Forage Crops and Wheat.—Results of culture experiments and variety tests.

Bulletin 142, pp. 15.—Small Fruit Trials at the College.—Descriptive notes and tabulated data on a large number of small fruits grown at the station during 1896.

Bulletin 143, pp. 43.—Fruit Tests at South Haven.—Descriptive notes and tabulated data on orchard and small fruits, nuts, etc., grown at the South Haven substation in 1896.

Bulletin 144, pp. 36.—Vegetables, Old and New.—Descriptive notes and tabulated data on several hundred varieties of vegetables grown during 1896.

Annual Report, 1895, pp. 99–669.—This embraces a brief report by the director outlining the work of the year; results of culture and fertilizer experiments with various forage and grain crops; the college herd record; summary of results of sheep-feeding experiments; experiments in swine feeding; popular notes on dairying, handling of milk, etc.; outlines of the work of the horticultural and chemical departments; notes on some of the more injurious insects of the season; notes on various Michigan weeds and on corn smut; results of the season's work in the apiary; meteorological record for 1894; reprints of station bulletins 111 to 124; reprints of press bulletins 7 and 8, on Alsike Clover and Canker Worms in the Orchard, respectively; and a financial statement for the fiscal year ending June 30, 1895.

The work of the Michigan Station has been actively prosecuted during the year. The administration of the present president of the college seems to have become firmly settled, and a somewhat more liberal policy of management is pursued by the board of control.

MINNESOTA.

Agricultural Experiment Station of the University of Minnesota, St. Anthony Park.

DEPARTMENT OF THE UNIVERSITY OF MINNESOTA.

The work of the Minnesota Station during the past year has been along the same lines as heretofore, including field experiments with grain and forage crops, flax grown for fiber and for seed, rotation of crops, etc.; horticultural and forestry investigations; entomological investigations, especially with reference to the repression of the chinch bug, Hessian fly, and grasshopper; chemical studies of soils, flax, foods, etc.; investigations in dairy farming and dairying; studies in veterinary science and practice, with special reference to the use of tuberculin and hypodermic cathartics; feeding experiments with beef cattle, sheep, and swine; pasturage experiments with sheep and breeding experiments with sheep and swine. A considerable amount of interesting work in the breeding of varieties of grain, forage, and root

crops is in progress, and already important practical results have been reached. Valuable studies on the types of dairy cows have been materially advanced during the past year. The experiments in growing summer forage for sheep have attracted widespread attention and seem likely to prove of value to sheep growers. Important studies on the nutritive value and digestibility of flour and bread have been made in cooperation with this Department. The station has also cooperated with this Department in experiments in forestry and with sugar beets. Valuable books on Vegetable Gardening and The Chemistry of Dairying, by officers of the station, were published during the past year.

The substations at Crookston and Grand Rapids have been regularly organized and equipped, and a variety of experiments are in progress at these places. The State continues to provide funds for their maintenance.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State	10,020.41
Farm products	3,883.86
 Total	 28,904.27

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 47-53 and the Annual Report for 1895.

Bulletin 47, pp. 30, figs. 5.—Flax.—A report giving the results of investigations of the draft of the flax crop on soil fertility; the chemical analysis of different types of seed, of the plant at different stages of growth, and of the straw and flax when cured as hay; the amount of oil yielded by different varieties of seed; the composition, digestibility, and feeding value of linseed meal, and a study of the soils best suited to flax culture.

Bulletin 48, pp. 240, pls. 16, figs. 187.—Insects Injurious in 1896.—A comprehensive report on insects injurious to vegetation during 1896, giving results in some cases of spraying experiments for their repression. The subject of parasitism, using the term in its widest sense, is considered at considerable length, illustrated descriptive and life-history notes being given for some 128 species, together with a number of recipes for dips, ointments, and other remedial measures.

Bulletin 49, pp. 45, figs. 13.—Rate of Increase on the Cut-Over Timber Lands of Minnesota.—Presents the results of a study of the cut-over timber land of the State and estimates their probably natural increase in value. The losses occasioned by forest fires, the forest resources of the State, the conditions of stump land after burning, and the rate of increase by actual measurements in small and scattered trees are given at some length. The condition of the stump land after logging and of natural restocking of unburned land are described. Notes and miscellaneous letters bearing on the subject of restocking cut-over lands are appended.

Bulletin 50, pp. 37.—Progress at the Several Experiment Farms in 1896.—Variety and Cultural Tests with Field Crops and Rotation Experiments.—Briefly notes the progress at the several experiment farms in 1896 and gives the results of variety tests with beans, barley, corn, oats, wheat, peas, and various root crops; culture experiments with corn, wheat, and sugar beets, and cross-rotation experiments,

including tabulated yields of 1895 and 1896 of the various crops used in the experiment.

Bulletin 51, pp. 75, pls. 8.—*Bovine Tuberculosis.*—Notes on the nature of this disease, with results of extended investigations on the station and other herds in the use of tuberculin as a diagnostic agent.

Bulletin 52, pp. 22, figs. 11.—*Potatoes.—Variety Tests in 1896.*—*Potato Implements.*—Descriptive notes and tabulated data on a number of variety tests, with popular illustrated notes on potato implements.

Annual Report, 1895, pp. 392.—Report of the chairman of the experiment station corps on the work of the station and substations; list of bulletins published during the year; donations to the station; a financial statement for the year ending December 31, 1895, and a reprint of Bulletins 41–46.

The work of the Minnesota Station has been actively and successfully prosecuted during the past year. The university with which the station is connected is highly prosperous, the facilities for agricultural instruction have recently been materially increased, the institution enjoys the support and confidence of the farmers, as well as of people of other occupations, and the station continues to benefit largely by the liberality of the State. The organization of the station has been strengthened by making the director more definitely its executive head, thus bringing the station management into harmony with the plan which experience shows is productive of the best results.

MISSISSIPPI.

Mississippi Agricultural Experiment Station, Agricultural College.

DEPARTMENT OF MISSISSIPPI AGRICULTURAL AND MECHANICAL COLLEGE.

The work of the Mississippi Station during the past year has been mainly along the same lines as heretofore, including botanical studies on cotton, grasses, and fungi; variety, fertilizer, and culture experiments with cotton, corn, oats, vetches, and other forage plants; feeding experiments with milch cows with special reference to the use of shredded corn fodder and with pigs on cooked cotton seed; horticultural investigations, especially with small fruits, fertilizers, and on irrigation problems; chemical and physical studies of soils with reference to moisture and fertilizer requirements; entomological investigations; studies in veterinary science and practice.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	815.53
Miscellaneous	64.98
Total	15,880.51

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the fiscal year were Bulletins 38, 39, and 41, and the Annual Reports for 1895 and 1896.

Bulletin 38, pp. 28.—*Mississippi Fungi.*—Lists of the observed genera and species of fungi in the State to May, 1896, including 85 species not named in former station lists. Twenty-one of the species are new and 7 are described for the first time.

Bulletin 39, pp. 10.—Feeding for Beef.—Results of feeding experiments with two steers to test the value of shredded corn fodder and jack beans and to compare them with rations of ordinary hay and cotton-seed meal.

Bulletin 41, pp. 6, figs. 4, map 1.—The Colorado Potato Beetle in Mississippi.—Popular notes on this insect, giving its history and distribution in the State and suggestions as to remedies.

Annual Report, 1895, pp. 108.—Embraces a financial statement for the fiscal year ending June 30, 1895; report of the director outlining work of the year and giving a list of bulletins published; results of variety, fertilizer, and culture experiments with cotton and corn; notes on grasses, forage plants, wheat, and miscellaneous crops; notes on the use of fertilizers and on the tile-drain system at the station; results of feeding experiments with cattle; notes on various diseases of horses, with suggestions as to remedies; descriptive notes on a number of orchard and small fruits growing at the station; general entomological notes of the season; report of digestion experiments on sheep; results of analyses of soils, marls, fertilizers, insecticides, waters, clays, etc., and a meteorological summary for 1895.

Annual Report, 1896, pp. 3.—Report of the treasurer for the fiscal year ending June 30, 1896, and brief notes on the general work of the year.

Little change occurred in the affairs of the Mississippi Station until near the close of the fiscal year, when the director and entomologist resigned. The station is proceeding under the new management without radical changes in work or policy.

MISSOURI.

Missouri Agricultural College Experiment Station, Columbia.

DEPARTMENT OF THE COLLEGE OF AGRICULTURE AND MECHANIC ARTS OF THE UNIVERSITY OF THE STATE OF MISSOURI.

The work of the Missouri Station during the past year has included field experiments with corn, oats, potatoes, forage crops, fertilizers, rotation of crops, etc.; feeding experiments with beef, cattle, and hogs; sheep breeding; field, greenhouse, and laboratory experiments in horticulture; investigations of animal diseases, especially Texas fever; entomological studies; analysis and inspection of fertilizers and dairy products under State laws. The field work has been reorganized and is now conducted with a definite plan on areas sufficiently limited to admit of close supervision. Through the liberality of the university authorities the quarters of the station in the university buildings have been enlarged and improved. Considerable scientific apparatus and other facilities have been added to the equipment of the station. The station is carrying on experiments with sugar beets in cooperation with this Department.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000.00
Fees.....	308.66
Farm products.....	1,024.66
Miscellaneous.....	1,779.79
 Total.....	 18,113.20

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of the station received during the past fiscal year were Bulletins 34-37 and the Annual Report for 1896.

Bulletin 34, pp. 35.—Manures and Fertilizers.—This embraces a report on the enforcement of the fertilizer control law; analyses of 18 samples of fertilizers; a report on fertilizer tests with wheat, together with popular notes on the waste of farm manure and on green manuring.

Bulletin 35, pp. 25, figs. 6.—The Woolly Aphis of the Apple.—A popular account of this insect; its life history, habits, injury to orchards in Missouri, and the results of experiments with various insecticides for its repression.

Bulletin 36, pp. 19, figs. 6.—The Lesser Apple-Leaf Folder. The Leaf Crumpler.—An account of the damages committed by these insects in Missouri during the years 1895 and 1896; their life histories and habits; and of experiments undertaken to determine the best remedies for their repression.

Bulletin 37, pp. 58, figs. 11.—Texas Fever.—A report on experiments carried on at the station grounds and in cooperation with the State board of agriculture and the Texas Experiment Station concerning the "Tick Theory" of the transmission of this disease, the prevention of Texas fever, and the disinfection of pastures; and to determine if the Australian cattle fever is identical with Texas fever.

Annual Report for 1896, pp. 16.—Includes a financial statement for the fiscal year ending June 30, 1896, and a report by the director on the work of the year and on the station staff, buildings, and equipment.

The Missouri Station is being conducted on a systematic and progressive policy. Its work is being concentrated in lines of great importance to the agriculture of the State, and its outlook for increased usefulness and success is very encouraging.

MONTANA.

Montana Agricultural Experiment Station, Bozeman.

DEPARTMENT OF MONTANA AGRICULTURAL COLLEGE.

The work of the Montana Station during the past year has included field experiments with grains, forage plants, sugar beets, potatoes, and other root crops; feeding experiments with sheep and pigs; horticultural investigations, especially with apples, strawberries, tomatoes, and celery; irrigation investigations; studies of alkali soils; chemical and biological studies of poisonous plants and native forage plants; and investigations of diseases of plants and animals. A survey of the waters of the State is being made in cooperation with the United States Geological Survey, and experiments with sugar beets are being conducted in different localities in cooperation with this Department.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State	10,057.15
Farm products	1,946.17
Total	27,003.32

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by the Department, and has been approved.

The publications of this station received during the past fiscal year were *Bulletins* 10-13.

Bulletin 10, pp. 20.—*Small Grains: Wheat, Oats, and Barley.*—Investigations on methods of soil preparation and seeding in general practice; quantity of seed per acre; variety comparisons; and methods of preventing smuts.

Bulletin 11, pp. 10, figs. 4.—*Devices for Obtaining a Constant Flow in Laterals with Variable Heads in the Main Canals or Reservoirs.*—Points out the importance of better means of controlling and measuring water and describes 3 devices for this purpose, one of which was originated at the station.

Bulletin 12, pp. 46.—*Annual Report of the Treasurer, Director, Horticulturist, and Chemist, and a Bulletin on the Spaying of Mares.*—This embraces a financial report for the fiscal year ending June 30, 1896, and a report by the director on the personnel of the station, farm buildings, experimental plats, the acreage and yield of general farm crops, and giving a list of bulletins issued, acknowledgments, exchanges, etc.; the report of the horticulturist on the work of the year, together with a list of the fruits growing at the station, results of experiments in growing nursery stock, and of culture and variety tests of strawberries; a brief report by the chemist outlining the work of the year, and a detailed account of the operations and results of spaying 22 mares. Directions are also given for the treatment of potato scab and smut of grain.

Bulletin 13, pp. 15.—*Drinking Water.*—Popular notes on the principal constituents of drinking water, the character of water from the different kinds of soils, and the purification of water, together with analyses of 23 samples.

The college with which the Montana Station is connected has obtained funds for the erection of buildings, and the station will soon have greatly improved quarters for its work, especially in chemistry. The buildings on the station grounds have also been improved. Much attention has been given the past year to the reorganization and development of the station operations and much useful work is now in progress. The influence of the station is increasing, and the station officers are making special efforts to keep in close touch with the farmers. In general, the affairs of the station are in more satisfactory condition than hitherto and its outlook is quite encouraging.

NEBRASKA.

Agricultural Experiment Station of Nebraska, Lincoln.

DEPARTMENT OF THE UNIVERSITY OF NEBRASKA.

The work of the Nebraska Station during the past year has been mainly along the same lines as heretofore, and has included field experiments with sugar beets, oats, corn, and forage plants; horticultural and forestry investigations; botanical studies of grasses, forage plants, fungi, and weeds; chemical investigations, especially of sugar beets, grains, and corn; veterinary investigations, especially of hog cholera and tuberculosis; entomological investigations, especially on diseases of grasshoppers and the chinch bug; studies on soils and irrigation. The field work of the station has been developed and strengthened. The university farm is still under control of the station, but is utilized more extensively than formerly for station purposes. Plans are being made for making the station responsible for the man-

agement of only as much land as it needs. A chemical laboratory for station purposes has been built at the farm. Special attention is being given to studies on the sugar beet. The experiments include the culture, breeding of varieties, seed production, treatment of seed, and utilization of the refuse of sugar factories. Chemical investigations of the sugar beet are also made. Studies of windmills, artesian well supply, etc., have been made with the aid of the university funds; work in gauging streams has been done in cooperation with the United States Geological Survey. The station has cooperated with this Department in work in forestry and on soils, grasses, and sugar beets. It has been relieved of routine duties in connection with the State weather and crop service.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	583.89
Miscellaneous	433.35
Total	16,017.24

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the fiscal year were Bulletins 45-49 and the Annual Report for 1896.

Bulletin 45, pp. 49, charts 37.—The Rainfall of Nebraska.—A complete record of observations on the rainfall of Nebraska from 1876 to 1895, with comments.

Bulletin 46, pp. 56, charts 14.—Nebraska Weather and Climate for 1896.—General notes on the weather, with summaries of meteorological observations at some 125 stations in the State from January to July, 1896.

Bulletin 47, pp. 11.—Serum Therapy in Hog Cholera.—A general discussion of the subject, with results of inoculation experiments at the station and of field tests with 1,176 hogs.

Bulletin 48, pp. 28, Figs. 5.—Windbreaks.—A popular bulletin, summarizing 125 replies to a circular of inquiry on this subject and giving the results of the station studies and observations along the same lines.

Bulletin 49, pp. 6.—Suggestions for Chicory Culture—Brief popular notes and cultural directions.

Annual Report, 1896, pp. 32.—Report by the director on the general management of the station, additions to the station personnel, station improvements and progress, bulletins published during the year; outlines of work by heads of departments; and a financial statement for the fiscal year ending June 30, 1896.

The Nebraska Station has made progress during the past year in strengthening its work, particularly in the direction of field experiments and in obtaining relief from routine duties more properly performed by other agencies. The needs of the agriculture of the State are so pressing and varied that this station, as well as many others, has to contend with more or less impatience on the part of the farmers because results of immediate practical application are not more quickly and numerously obtained. Thus far, however, the State has not supplemented the United States funds for experimental purposes to any great extent, and the station is doing wisely in confining its attention to comparatively few lines of work.

NEVADA.

Nevada Agricultural Experiment Station, Reno.

DEPARTMENT OF NEVADA STATE UNIVERSITY.

The work of the Nevada Station during the past year has included field experiments with wheat, alfalfa, sugar beets, and other crops; horticultural investigations; studies in botany and entomology; chemical analyses; investigations of animal diseases, and experiments in dairying. The station has in recent years been able to extend its field operations through the use of land belonging to the State Agricultural Society, but it would be much better if land in the immediate vicinity of the university could be obtained on terms which would permit its permanent use for station purposes. The station is carrying on cooperative experiments with sugar beets, grains, and potatoes in different localities.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	310.75
Miscellaneous	16.60
Total	15,327.35

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 30 and 31 and the Annual Reports for 1894 and 1895.

Bulletin 30, pp. 7.—Wheat Cutting at Different Dates.—Record of harvesting wheat at different dates, with food analyses of the different cuttings.

Bulletin 31, pp. 15.—Texas Cattle Fever.—Reprint of a press bulletin issued in 1894, with additional matter pertaining to the subject.

Annual Report, 1894, pp. 28.—Reports by director and heads of departments on the work of the year, including results of culture experiments with various field crops, and a financial statement for the fiscal year ending June 30, 1894.

Annual Report, 1895, pp. 23.—Brief reports by the director and heads of departments on the year's work, including results of variety tests and culture experiments with wheat, and a financial statement for the fiscal year ending June 30, 1895.

The University of Nevada, with which the station is connected, has in recent years very largely overcome the difficulties incident to the building up of educational institutions in new and sparsely settled communities. Naturally, the main efforts of the managers of the university have been directed toward the establishment of the university on a sound basis and the providing of proper facilities for the care and instruction of students. Their efforts in this direction have of late been quite successful, and the institution has prospered. The strengthening of the university as a whole will doubtless in the end be greatly to the advantage of the experiment station, but thus far the station work has not been developed as fully as that of other departments of the university. Greater attention is, however, now being given to the needs of the station, and it is hoped that hereafter the station officers will be able to devote themselves more completely

to carrying on original investigations which may help to develop the agriculture of the State, and that they will be provided with more ample facilities for the work of research.

NEW HAMPSHIRE.

New Hampshire College Agricultural Experiment Station, Durham.

DEPARTMENT OF NEW HAMPSHIRE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS.

The work of the New Hampshire station during the past year has included variety, fertilizer, and culture experiments with corn, potatoes, Japanese millets, grasses, and leguminous plants; soil tests in boxes and in the field; feeding experiments with cows on the use of silage from different varieties of corn and certain commercial feeding stuffs, and with calves on the comparative value of linseed meal, flaxseed meal, and whole flaxseed with and without skim milk; horticultural investigations, including variety and culture experiments with sweet corn and strawberries and greenhouse experiments with vegetables; fertilizer analysis and inspection; chemical studies of cattle foods and silage; entomological investigations, especially on the parasites of the tent caterpillar and the spruce-bark borer; bacteriological studies, especially on tuberculosis, creamery cultures, and potato scab. The equipment of the station has been improved by the erection of an insectary and a new greenhouse, which will be partly used for station purposes. A piece of experimental road has also been built.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000.00
Fees for fertilizer analysis.....	1,248.00
Farm products.....	2,029.68
Total.....	18,272.68

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 35-45.

Bulletin 35, pp. 7, figs. 3.—The Codling Moth and the Apple Maggot.—Popular notes on the nature and habits of these insects, with suggestions as to remedies.

Bulletin 36, pp. 4.—Analyses of Three Common Insecticides.—Results of analyses of samples of Paris green, London purple, and white hellebore.

Bulletin 37, pp. 4.—Crimson Clover.—Popular cultural notes.

Bulletin 38, pp. 14, figs. 14.—The Tent Caterpillar.—Popular notes on the history, food plants, diseases, and natural enemies of this insect, with suggestions as to methods of suppression.

Bulletin 39, pp. 14, figs. 10.—The Army Worm.—A brief history of the army worm in New England, together with illustrated, descriptive, and life-history notes, and suggestions as to methods of repression.

Bulletin 40, pp. 16, figs. 4.—Eighth Annual Report—Report of the treasurer for the fiscal year ending June 30, 1896; list of bulletins published during the year, and brief reports by the heads of departments on the year's work, including the insect record for 1896.

Bulletin 41, pp. 14, figs. 2.—*Potatoes.*—Results of variety tests and fertilizer experiments, with notes on the use of corrosive sublimate for treatment of potato scab.

Bulletin 42, pp. 8, fig. 1.—*Tomato Growing in New Hampshire.*—*Notes on Tomato Breeding.*—Descriptive notes and tabulated data on 56 varieties of tomatoes, with brief popular notes on tomato breeding.

Bulletin 43, pp. 4.—*Some Inferior Wood Ashes.*—Results, with comments, are given on analyses of a number of Canadian, domestic, and refuse ashes, and on one sample of adulterated Paris green.

Bulletin 44, pp. 9, figs. 7.—*The Cankerworm.*—The life history and enemies of the cankerworm are discussed and suggestions given as to methods of repression.

Bulletin 45, pp. 12, figs. 3.—*Fruit and Potato Diseases.*—Results of experiments in the treatment of fungus diseases of fruit and potatoes.

The work of the New Hampshire Station has been steadily pursued during the past year and the number and importance of its investigations have been increased. The governing board has recently voted to relieve the station of the management of the farm and creamery. Field experiments will hereafter be confined to comparatively small areas and feeding and dairy experiments will be conducted in cooperation with the college. It is believed that this will enable the station to concentrate its work more fully on important investigations and to use its funds more strictly for experimental inquiries.

NEW JERSEY.

New Jersey State and College Agricultural Experiment Stations, New Brunswick.

CONNECTED WITH RUTGERS COLLEGE.

The New Jersey State and College Stations continue to be under the supervision of the same director and to issue their publications in one series. The work of these stations during the past year has been mainly along the same lines as heretofore, including analysis and inspection of commercial fertilizers; chemical studies of fertilizers, feeding stuffs, and dairy products; investigations on the food and nutrition of man; investigations in dairying and dairy husbandry; field experiments with fertilizers on cereals, vegetables, and fruits, and in green manuring and rotation; irrigation experiments; horticultural investigations, with special reference to the nutrition of horticultural plants; biological studies, especially on tuberculosis; botanical investigations, especially on plant diseases; and entomological investigations. The work on the farm has been thoroughly organized, and a number of useful and important investigations are being conducted there. The equipment of the stations has been enlarged, especially in the departments of botany, horticulture, and chemistry, including dairying. The investigations on the food and nutrition of man have been conducted in cooperation with this Department.

The income of the stations during the past fiscal year was as follows:

State Station:

 State appropriations (fiscal year ending October 31, 1897) \$15,000

College Station:

 United States appropriation 15,000

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 116-121 and the Annual Report for 1896.

Bulletin 116, pp. 15, figs. 3.—The Pernicious or San José Scale.—A brief review of previous work at the station on the life history of the scale, with a summary of the observations made on the insect in California during a recent visit to the State for that purpose.

Bulletin 117, pp. 76.—Analyses of Fertilizers.—Trade values of fertilizing constituents in 1896; results of examinations of the standard materials supplying them as well as of home mixtures, factory-mixed fertilizers, and miscellaneous fertilizing substances, and analyses and valuations of 495 samples of fertilizing materials.

Bulletin 118, pp. 24.—The Suppression and Prevention of Tuberculosis of Cattle and Its Relation to Human Consumption.—A popular bulletin on this subject.

Bulletin 119, pp. 23.—Apple Growing in New Jersey.—Results of a statistical fruit survey of the State made in 1895, giving methods of culture and marketing at present employed in the State, and pointing out some of the underlying principles of successful culture.

Bulletin 120, pp. 19, pls. 2.—Field Experiments with Potatoes for 1896.—Results of experiments for the prevention of seab and soil rot of Irish and sweet potatoes, respectively, and of culture experiments with Irish potatoes.

Bulletin 121, pp. 14, fig. 1.—The Harlequin Cabbage Bug and the Melon Plant Louse.—A popular account of these two insects, with descriptive and life-history notes and suggestions as to preventive and remedial measures.

Annual Report, 1896, pp. 563.—This embraces the financial reports of the treasurers; report by the director outlining the work of the year; fertilizer statistics on the quantity and value of fertilizers used in New Jersey during 1895; review of the market price of various fertilizers, trade values of fertilizing ingredients for 1896, analyses and valuations of 495 samples of fertilizing materials; results of investigations on the availability of organic nitrogen in 53 samples of fertilizing materials; results of investigations on the volumetric estimation of phosphoric acid in 276 samples of complete fertilizers by the official method in comparison with Kilgore's volumetric method; analyses of a number of fodders and feeds; market prices of commercial feeds from 1891 to 1896; compiled analyses of the more common feeding stuffs; a reprint from Office of Experiment Stations Bulletin 35 on the Cost and Composition of Milk in Cities in New Jersey; notes on the treatment of the various experimental plats of fruits and vegetables; notes and data on soiling and soiling crops; a reprint from Office of Experiment Stations Bulletin 36 on Irrigation in New Jersey; results of temperature observations and tuberculin tests with cattle; reprint of Station Bulletin 118; results of extensive work with fungicides upon truck crops and ornamental plants; results of irrigation experiments on garden crops; notes on mulching, the station herbarium, a new weed-seed holder, and on various weeds; results of experimental work with a number of blights and diseases and with peach-root galls; brief abstracts of a number of other experiment station bulletins; a general review of the insect depredations of the season, with a more extended account of those doing most injury; and a report upon

extended investigations carried out in California on the San José scale and its natural enemies.

The New Jersey stations have made substantial progress in their work during the past year. They continue to be managed under an active and progressive policy which provides for a combination of practical and scientific effort on behalf of the agriculture of the State.

NEW MEXICO.

Agricultural Experiment Station of New Mexico, Mesilla Park.

DEPARTMENT OF NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

The work of the New Mexico Station during the past year has included field experiments with wheat, sugar beets, sweet potatoes, and canaigre; horticultural experiments with orchard fruits, vegetables, and ornamental plants; experiments in irrigation; chemical studies, especially on "alkali" soils, foods, sugar beets, and methods of soil analysis; studies in systematic botany, and entomological investigations, especially on scale insects and other orchard pests. During fully half the year the entomologist received no salary, but continued his studies with great assiduity, and has at length been restored to his position as a regular member of the station staff. Investigations on human foods, sugar beets, and insects have been carried on in cooperation with this Department. A new building (fig. 2), costing about \$10,000, is now being erected with Territorial funds, which will be largely used for the chemical and biological work of the station.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	163.40
Total	15,163.40

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 19 and 20 and the Annual Report for 1896.

Bulletin 19, pp. 20, fig. 1.—Report of the Entomologist, Part 1.—An account is given of the localities visited by the entomologist during the past year, and the insects noted at each place. Special descriptive and life-history notes are given on several of the more injurious species.

Bulletin 20, pp. 26.—Seeds.—Popular bulletin treating of the subject under the following heads: General remarks; testing seeds; process of germination; the improvement of crops by seed selection; change of seed; harvesting and storing; vitality: insects affecting; treatment for smut; and amount of seed required for sowing per acre.

Annual Report for 1896, pp. 31.—Brief reports by the director and heads of departments on the work of the year, including a subject list of 64 papers published by the entomologist; reports by the superintendents of the Las Vegas and San Juan substations, giving the plan of the year's work; and a financial statement for the fiscal year ending June 30, 1896.

The New Mexico Station made considerable progress during the past year in strengthening and developing its work. Its financial affairs were put on a sounder basis and economies introduced which were



FIG. 2.—NEW LABORATORY BUILDING OF NEW MEXICO AGRICULTURAL COLLEGE AND EXPERIMENT STATION.

materially to the advantage of the station. The expenses attending the maintenance of substations continued to be a drain upon the resources of the station, without giving results of equivalent value. The expenditures for the substations have, however, been reduced, and an effort is being made to make their work more efficient. With the incoming of a new administration in the government of the Territory some changes have been made in the governing board. It is hoped, however, that the shifting policies which have hitherto greatly weakened this station will not again prevail. The liberality of the Territory in providing funds for the new buildings for the college and station is a good indication of increasing popular interest in this institution. With a consistent and permanent policy, based on the necessary requirements of educational and scientific work, the New Mexico College and Station may rapidly grow into a strong institution.

NEW YORK.

New York Agricultural Experiment Station, Geneva.

The work of the New York State Station during the past year has included the analysis and inspection of commercial fertilizers; feeding experiments with dairy cattle, including comparison of breeds and studies of the sources of milk fat; feeding and breeding experiments with poultry; field experiments with potatoes, sugar beets, and forage crops; investigations in plant nutrition, especially the fertilizer requirements of fruits and vegetables and the foraging power of different species of plants for phosphoric acid; horticultural investigations, including tests and other studies of varieties, plant breeding and experiments with fertilizers, and in forcing vegetables; studies of plant diseases, especially leaf spot of plums and cherries, peach yellows, carnation rust and stem rot, onion smut, and potato diseases; entomological investigations on cut worms, San José scale, apple fruit worm, woolly aphid, striped cucumber beetle, insecticides, etc.

In cooperation with this Department and the town of Geneva the station has made over a mile of "good road" on the neighboring public highway, illustrating several different methods for the improvement of country roads. Investigations in horticulture, including plant diseases, were continued on Long Island under a special appropriation. Additions have been made to the equipment of the station, and plans for additional improvements are being formed. The work involved in the inspection of fertilizers is excessively great. More than 1,600 different brands of fertilizers are now sold in the State, a condition of things believed to be unfortunate alike for the farmer and the manufacturer.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$1,500.00
State	81,276.54
Farm products	1,715.03
 Total	 84,491.57

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the fiscal year were Bulletins 102-124, and the Annual Report for 1895.

Bulletin 102, pp. 17, figs. 4.—Silage and Silos.—A popular bulletin on this subject.

Bulletin 103, pp. 14.—Provisions of the New Fertilizer Law of New York.—Text of the State fertilizer law, with comments, and a brief statement of the work accomplished in fertilizer inspection.

Bulletin 104, pp. 9, figs. 2, pls. 2.—*Notes on the Recent Invasion of the Army Worm.*—A popular account of this invasion in 28 counties of New York, with descriptive, life-history, and remedial notes, and brief remarks on natural enemies.

Bulletin 105, pp. 22.—Effects of the Drouth on Milk Production.—Results of a study of variations which milk undergoes as a result of climatic conditions, based on an analysis of the milk of 50 herds of cows supplying cheese factories in New York in 1895.

Bulletin 106, pp. 10.—Feeding Experiments with Laying Hens.—The Relative Efficiency of Whole and Ground Grain.—Results of investigations on these subjects.

Bulletin 107, pp. 61.—Report of Analyses of Commercial Fertilizers for the Spring of 1896.—This bulletin includes explanations of terms used in stating the results of analyses of fertilizers; notes on valuation; comparison of selling price and commercial valuations; list of manufacturers complying with the provisions of the fertilizer law; and analyses of 313 samples of fertilizers examined during the spring of 1896.

Bulletin 108, pp. 6.—The Real Value of "Natural Plant Food."—Popular notes on the use of this material as a fertilizer, based on the result of chemical analyses.

Bulletin 109, pp. 22, pl. 1.—Strawberries.—Descriptive notes and tabulated data on a number of varieties grown in beds set one and two years, respectively.

Bulletin 110, pp. 30.—Milk Fat and Cheese Yield.—Results of a study undertaken for the purpose of learning the existing relation between milk fat and casein or cheese yield with individual herds of cows; and for the further purpose of ascertaining whether milk fat forms the fairest basis of paying for milk for cheese making. The studies are based on the analyses of the milk of fifty herds of cows.

Bulletin 111, pp. 13.—Variety Tests with Blackberries, Dewberries, and Raspberries.—A brief report giving the result of the season's work along these lines.

Bulletin 112, pp. 13.—Economy in using Fertilizers for Raising Potatoes.—Details and results of fertilizer experiments with potatoes.

Bulletin 113, pp. 7, pl. 1.—The Cucumber Flea-beetle as the Cause of Pimply Potatoes.—Result of investigations identifying the flea-beetle as the cause of pimply potatoes.

Bulletin 114, pp. 48, figs. 6, pls. 11; Popular edition, pp. 9, pls. 4.—Gooseberries.—This bulletin embraces a comparison of native with European varieties; notes on the botanical features of the species from which cultivated gooseberries are derived; gooseberry culture at the station; descriptive list of varieties; methods of propagation; field and garden culture, and notes on injurious insects.

Bulletin 115, pp. 26, figs. 9.—Director's Report for 1896.—Gives the status of the station when the present director assumed control; methods employed in the distribution of station information; outline of future work and development of the station; important results of 1896; notes on the character and work carried on in the second judicial department, and a discussion on the relationship of New York farmers to the station.

Bulletin 116, pp. 56.—Report of Analyses of Commercial Fertilizers for the Fall of 1896.—This gives an explanation of the terms used in

stating the results of chemical analyses of fertilizers; trade values of fertilizing ingredients in raw materials and chemicals; methods of commercial valuation of fertilizers; number and kinds of fertilizers collected in 1896; comparison of selling price and commercial valuation; cost of 1 pound of plant food in different materials as purchased by consumers; commercial names used for phosphoric acid in fertilizers, and results of the analyses of 261 samples of fertilizers collected in the fall of 1896.

Bulletin 117, pp. 9. Popular edition, pp. 4.—Treatment of Leaf Spot in Plum and Cherry Orchards in 1896.—Results of spraying experiments.

Bulletin 118, pp. 10. Popular edition, pp. 5.—Alfalfa: Its Value, Culture, and Use.—Popular notes on alfalfa, its history, character, yield, analysis, food value, food requirements, and culture.

Bulletin 119, pp. 29, figs. 2, pls. 4. Popular edition, pp. 5, figs. 2.—Downy Mildew of the Cucumber: What it is and How to Prevent it.—Popular notes on the history and nature of this disease, with results of spraying experiments with Bordeaux mixture for its prevention. Brief notes are also given on the preparation of Bordeaux mixture and on spraying machinery, etc.

Bulletin 120, pp. 13, pls. 6. Popular edition, pp. 5, pls. 2.—A Practical Method of Combating Cutworms in Onion Fields.—The history, life history, habits, and distribution of the dark-sided cutworm (*Carneades messoria*) are given, together with results of experiments with insecticides for its repression and recommendations as to the best methods for its treatment.

Bulletin 121, pp. 23, figs. 14. Popular edition, pp. 6.—Spray Pumps and Spraying.—A popular bulletin on this subject.

Bulletin 122, pp. 12, pls. 3. Popular edition, pp. 5, pls. 2.—The Pistol-Case Bearer.—Popular bulletin on this insect, giving its history, relationships, life history, distribution, and natural enemies, and the results of spraying experiments for its repression.

Bulletin 123, pp. 26, figs. 2. Popular edition, pp. 6.—Spraying Potatoes on Long Island in the season of 1896.—Results of investigations, with directions for spraying potatoes, and of a test of a Bordeaux spraying machine.

Bulletin 124, pp. 14, pl. 1. Popular edition, pp. 5, pl. 1.—Anthracnose of the Black Raspberry.—Results of three years' experiments in combating that disease.

Annual Report, 1895, pp. 666.—This embraces the treasurer's report for the fiscal year ending September 30, 1895; a brief report on the work of the year by the acting director; list of acknowledgments; rules of the station governing gratuitous chemical analysis for private persons; report of the horticulturist on special work of the second judicial department, testing orchard fruits, with descriptive notes on a number of varieties of apples, crab apples, apricots, grapes, and on the Lutovka cherry, a paper on the productiveness of grapes as affected by self-fertilization of their blossoms, popular notes on raspberry anthracnose, and on the treatment of common diseases and insects injurious to fruits and vegetables; report of the first assistant giving the results of miscellaneous feeding trials with cattle and hogs; report of the mycologist on two destructive lily diseases, prevention of cabbage club root, spraying tomatoes, a disease of Norway maples, witches' brooms on cherry trees, observations on *Exobasidium peckii* and *Ramularia cylindriopsis*, inoculation experiments with *Gymnosporangium macropus*, "belted" apples and pears, a new leaf-spot

disease of apples; reports of the entomologists on the oak scale, white tussock moth, cottonwood leaf beetle, cornworm, striped cucumber beetle, New York plum Lecanium, preliminary report of experiments with remedies for the potato flea-beetle, general notes on the insects of the season, notes on remedies for the pernicious and other scale insects, and on the bramble or blackberry flea-louse; reprints of Bulletins 88-97, and a revised reprint of Bulletin 99.

The past year has necessarily been a period of reorganization of the work of the New York State Station under the management of a director whose term of service began with the fiscal year. Much of the work along old lines has been continued, but a strenuous effort has been made to raise the grade of the investigations and to arrange for the prosecution of thorough inquiries in new directions as demanded by important agricultural interests of the State. Much emphasis has been laid on the proper preparation of popular bulletins, and a special officer has been appointed to put these publications into attractive and readable form. The station is doing a large amount of useful work, is reaching a great constituency of farmers, and enjoys the liberal financial support of the State. It deserves hearty and patient support in the important investigations which it is now undertaking along the higher lines of agricultural research. The aid which New York and some of the other relatively wealthy States are giving to the promotion of the more elaborate and profound agricultural inquiries is very encouraging. The outcome of such work will undoubtedly be of great importance to the agriculture of the whole country.

NEW YORK.

Cornell University Agricultural Experiment Station, Ithaca.

DEPARTMENT OF CORNELL UNIVERSITY.

The work of the New York Cornell Station during the past year has been mainly along the same lines as heretofore, including horticultural investigations; studies of plant diseases and remedies; entomological investigations; field and other experiments with wheat, oats, leguminous plants, potatoes, and sugar beets; studies in farm manures and fertilizers; chemical analyses of soils, fertilizers, forage plants, fruits, etc. The station, as well as the college of agriculture, has been largely engaged in special work provided for by a State appropriation of \$25,000 (\$16,000 last year) for "giving instruction by means of schools, lectures, and other university extension methods or otherwise, and in conducting investigations and experiments; in discovering the diseases of plants and remedies therefor; in ascertaining the best methods of fertilization of fields, gardens, and plantations; and best modes of tillage and farm management and improvement of live stock; and in printing leaflets and disseminating agricultural knowledge by means of lectures or otherwise; and in preparing and printing for free distribution the results of such investigations and experiments, and for republishing such bulletins as may be useful in the furtherance of the work; and such other information as may be deemed desirable and profitable in promoting the agricultural interests of the State."

The work of instruction conducted under this State law has been mainly an attempt to secure the introduction of "nature" teaching into the common schools of the State, especially in the rural districts.

Agents and lecturers have been employed, and circulars of information, relating largely to natural objects with which agriculture is concerned, have been issued to aid teachers in giving this instruction. This movement has attracted wide attention, and is apparently meeting with great success. The experimental inquiries, provided for by the same law, have consisted of over 500 cooperative experiments in different parts of the State with fertilizers, potatoes, and sugar beets. The work on sugar beets has been in cooperation with this Department. The State aid has also made it possible for the station to increase largely its output of popular bulletins. Valuable books on The Fertility of the Land, The Principles of Fruit Growing, The Forcing Book, and Milk and Its Products, by officers of the station, were published during the past year.

The income of the station during the past fiscal year has been as follows:

United States appropriation	\$13,500.00
State appropriation	16,000.00
Farm products	1,009.58
Total	30,509.58

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 116-136 and the Annual Report for 1895.

Bulletin 116, pp. 29, figs. 5.—*Dwarf Apples.*—Popular notes upon the subject of dwarfing in general, with remarks on dwarfing the apple and on the commercial value of such dwarfs.

Bulletin 117, pp. 47, figs. 13.—*Fruit Brevities.*—Short popular articles on the following subjects: “Packing houses for fruit;” “History of the Ohio raspberry;” “The ‘mistletoe disease’ of the blackberry;” “Root galls;” “Are dewberries worth growing?” “The goumi (*Elaeagnus longipes*);” “Winter injuries;” and “Crimson clover in orchards.”

Bulletin 118, pp. 6.—*Fruit Preservatives and Butter Increasers.*—Results of the examination of two food preservatives, “Preservitas” and “Callerine,” and two butter increasers, “Chase’s Butter Increaser” and “Gilt-edge Butter Compound.”

Bulletin 119, pp. 6, figs. 3.—*The Texture of the Soil.*—A popular bulletin tending to show the importance of having soil in good physical condition, with the results of analyses of an unproductive clay on which beans failed to grow, of an adjacent soil on which they grew well, and of a lime rock derived from the same locality.

Bulletin 120, pp. 22, figs. 11.—*The Moisture of the Soil and Its Conservation.*—A popular bulletin.

Bulletin 121, pp. 26, figs. 26.—*Suggestions for the Planting of Shrubbery.*—A discussion in popular form of landscape gardening “for the betterment of home grounds in rural communities.”

Bulletin 122, pp. 34, figs. 13.—*A Second Report upon Extension Work in Horticulture.*—A report on the progress of the work carried on under the experiment station extension or Nixon bill, covering the third year.

Bulletin 123, pp. 14, pls. 4.—*Green Fruit Worms.*—Notes on three noctuids—habits, food, history, distribution, life history, and natural enemies, and suggestions as to remedies.

Bulletin 124, pp. 17, fig. 1, pls. 2.—*The Pistol-Case Bearer in Western New York.*—Notes giving the history, distribution, appearance

food plants, life history, habits, and natural enemies, and suggestions as to remedies.

Bulletin 125, pp. 16, figs. 16.—*A Disease of Currant Canes.*—Results of investigations on a currant disease, giving its general and botanical characteristics and suggesting methods of treatment.

Bulletin 126, pp. 20, figs. 5, pls. 3.—*The Currant Stem Girdler and the Raspberry Cane Maggot.*—Historical, descriptive, and life-history notes on these insects, with remarks on distribution, habits, natural enemies, etc., including short bibliographies.

Bulletin 127, pp. 33, figs. 2.—*A Second Account of Sweet Peas.*—Notes on the second year's work at the university with sweet peas. Descriptions are given of the varieties grown with numerical notes on the blooming period, quantity of bloom, height of stem, seed production, etc., of 113 varieties.

Bulletin 128, pp. 38, figs. 9.—*A Talk about Dahlias.*—Brief history of the evolution of the dahlia; suggestions as to lines for future improvement; methods of culture and propagation; and results of a test of 354 varieties, a number of which are described.

Bulletin 129, pp. 8.—*How to conduct Field Experiments with Fertilizers.*—A popular bulletin.

Bulletin 130, pp. 13, figs. 3.—*Potato Culture.*—A report on investigations made to ascertain the possibilities of making the potential plant food of the soil available, and to note the effect of tillage on the crop.

Bulletin 131, pp. 27, figs. 12.—*Notes upon Plums for Western New York.*—Embraces general remarks upon 10 types of plums, with more particular reference to the European and Japanese types; notes on the present status and future prospect of plum culture; a discussion on planting, pruning, insect and fungus enemies, etc.; a report embodying 25 years' experience with plums on a commercial scale; and descriptive notes on 70 varieties.

Bulletin 132, pp. 30, figs. 20.—*Notes upon Celery.*—A general discussion is given on the early and late blights of celery with an account of artificial cultures of the fungi and of remedies for their repression, together with a short bibliography. Notes are also given on the construction of a celery storage house, and the results detailed of experiments with fertilizers and of celery analyses.

Bulletin 133, pp. 26, figs. 5.—*The Army Worm in New York.*—General, historical, descriptive, remedial, and life-history notes on the army worm, with remarks on food plants, natural enemies, habits, etc., and an account of the outbreak in New York in 1896.

Bulletin 134, pp. 6, figs. 2.—*Strawberries under Glass.*—Results of culture experiments in the greenhouse during the winter of 1896-97.

Bulletin 135, pp. 26, figs. 6.—*Forage Crops.*—Data on the growth of a large number of forage crops and of mixtures of such crops, with culture notes in most instances.

Bulletin 136, pp. 20, figs. 7.—*Chrysanthemums.*—General remarks upon the province of the station in testing varieties, exhibiting flowers, etc.; hints on the home growing of chrysanthemums; culture and variety notes on the tests of 1896 and descriptive notes on 24 which seemed to have special merit.

Annual Report, 1895, pp. 721.—Brief reports by the heads of departments on the work of the year, detailed financial statement for the fiscal year ending June 30, 1895, and reprints of station bulletins 84-105.

The New York Cornell Station has enjoyed a year of great prosperity. By the generous aid of the State it has been enabled to bring

its work home to the farmers more thoroughly than ever before. Its force of workers has been enlarged and arrangements made for developing and strengthening its work in various lines.

NORTH CAROLINA.

North Carolina Agricultural Experiment Station, Raleigh.

DEPARTMENT OF NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

The work of the North Carolina Station during the past year was mainly along the same lines as heretofore, including fertilizer analysis and inspection; feeding experiments with dairy cattle, sheep, and pigs; poultry experiments; field experiments with grain and forage crops; botanical and entomological investigations; horticultural experiments. The extensive cooperative horticultural experiments at Southern Pines, with special reference to the fertilizer requirements of orchard and small fruits and vegetables, have been continued. The State weather service, carried on by the station in cooperation with the Weather Bureau of this Department, was discontinued October 1, 1896. By a State law enacted in March, 1897, the inspection of nursery stock is put in charge of a commission consisting of the State commissioner of agriculture, director of the station, and president of the State horticultural society. The entomologist of the station has acted as entomologist of the commission.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State	10,000.00
Farm products	1,286.29
Total	26,286.29

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedule prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 126-140, Meteorological Bulletins 80-83, Special Bulletins 38-46, and the Annual Report for 1895.

Bulletin 126, pp. 5.—Why Not Improve Your Poultry?—A popular bulletin treating of the magnitude of the poultry industry, with directions for the care of poultry, choice of breeds, and marketing.

Bulletin 127, pp. 42, figs. 36.—Parasites of Domestic Animals.—Includes a brief discussion on the general classification of parasites; list of vermicides, with doses for various animals, and formulas for tonics, washes, liniments, and ointments; illustrated and descriptive notes on the principal parasitic worms and insects affecting domestic animals, symptoms caused by each, and methods of treatment.

Bulletin 128, pp. 8.—Pests of Grain Crops.—Popular bulletin containing formulas for insecticides and fungicides for the repression of the insect and fungus pests of a number of grain crops.

Bulletin 129, pp. 41, figs. 24.—Horticultural Experiments at Southern Pines, 1895.—Includes notes on the purpose of the experiments, location of the farm, geology of the region, climatic conditions, the soil and its comparative composition, plan of the tests, clearing of the land, varieties of fruit selected and general treatment, laying out plots, setting plants and subsequent cultivation, details and results

of fertilizer experiments, methods of recording the growth, making notes and securing photographic records, fungus and insect enemies and their treatment, growth during 1895 and conclusions therefrom.

Bulletin 130, pp. 54, figs 40.—*Poultry Keeping for Profit.*—A popular bulletin discussing poultry houses, pure-bred poultry, diseases, anatomy of the egg, the egg during incubation, natural incubation, artificial incubation, feeding, breeds and breeding, dressing and shipping poultry to market, etc.

Bulletin 131, pp. 12, figs. 12.—*Parasites of Poultry.*—A popular bulletin on the subject, largely compiled.

Bulletin 132, pp. 56, figs. 4.—*The Home Vegetable Garden and Its Pests.*—Popular directions for the location, choice of soil, rotation of crops, construction and use of cold frames, selection and use of manures, saving seed, etc., and on the culture of a large list of plants usually grown in gardens. Notes are also given on insects and fungus pests and on remedies for their repression.

Bulletin 133, pp. 15, figs. 5.—*Some New Forage, Fodder, and Other Useful Plants.*—Results of variety tests, with brief descriptions and notes on growth.

Bulletins 134 and 135.—Not to be published.

Bulletin 136, pp. 33.—*Fertilizer Analyses of the Fertilizer Control.*—Analyses and valuations of 379 samples of fertilizers, with explanatory notes.

Bulletin 137, pp. 5.—*A Warning in Regard to Compost Peddlers.*—A popular bulletin warning the farmers against paying exorbitant prices for special fertilizers and fertilizer formulas.

Bulletin 138, pp. 11, figs. 11.—*The San José Scale in North Carolina.*—A popular bulletin giving a brief description of the insect, its life history, modes of dissemination, and reporting seven experiments with insecticides for its repression.

Bulletin 139, pp. 14.—*Home-Mixed Fertilizers and Composts.*—A popular bulletin on the subject, including a large number of fertilizer formulas for different farm and garden crops.

Bulletin 140, pp. 6.—*Volumetric Estimation of Phosphoric Acid.*—A technical bulletin giving comparative phosphoric acid results on various fertilizing material by gravimetric and volumetric methods, with comments on methods employed.

State Weather Service Bulletins 80-83, pp. 16, each.—Monthly summaries of meteorological observations by the North Carolina section of the climate and crop service of the United States Weather Bureau, coöperating with the North Carolina Station.

Special Bulletins 38, 39, pp. 4, each.—*Fertilizer Analyses of the Fertilizer Control.*—Tabulated analyses of 69 samples of fertilizers.

Special Bulletins 40, pp. 13; 41, pp. 13; 42, pp. 18; 43, pp. 11; 44, pp. 24; 45, pp. 28.—*Fertilizer Analyses of the Fertilizer Control.*—Embrace abstracts of the State fertilizer law, explanation of terms used in stating analyses, notes on valuation, freight rates, and tabulated analyses of 175 samples of fertilizing materials.

Special Bulletin 46, pp. 4.—*Fertilizer Analyses of the Fertilizer Control.*—Tabulated analyses of 42 samples of fertilizers.

Annual Report for 1895, pp. LXI, 458.—This embraces a general review of the work of the fertilizer control station, notes on station equipment, list of station publications during 1895; acknowledgments, outlines by the director and heads of departments on the general work of the year, treasurer's report, and reprints of Bulletins 111 to 123.

The work of the North Carolina Station was actively prosecuted during the past year. Several causes combined, however, to make

this a period of uncertainty and change in the affairs of the station. At the session of the State legislature held in the winter of 1897 an act was passed creating a separate board of trustees for the college and station, which had hitherto been under the management of the State Board of Agriculture. By this act the members of the new board were appointed by the governor for terms of two, four, and six years, except the president of the college, who is ex officio a member of the board. As a result of the changes thus occurring in the personnel of the board of control of the station, the director of the station, who had been connected with it in different capacities some sixteen years, was removed and a further reorganization of the station staff was made. The offices of the director, horticulturist, botanist, and entomologist of the station were removed to college buildings, but the fertilizer control laboratory remains in the building occupied by the State Board of Agriculture. This separation of the station has not resulted in any contest with the State Board of Agriculture, with which the station continues to cooperate in enterprises for the benefit of the agriculture of the State. Meanwhile the validity of the State fertilizer law has been attacked in the courts. If the suits now pending are decided adversely to the State, the station will lose a portion of the funds it has been receiving under this law and its work will be severely crippled.

By the separation of the station from the control of the State Board of Agriculture the station has become more definitely a department of the State College of Agriculture. It is hoped that the ultimate outcome of this arrangement will be to remove the station, as well as the college, from political and other influences inimical to the best interests of educational and scientific institutions. Temporarily, however, the station has been weakened by the loss of successful and experienced officers and by the uncertainties attending a change of management and a somewhat dubious financial outlook.

NORTH DAKOTA.

North Dakota Agricultural Experiment Station, Fargo.

DEPARTMENT OF NORTH DAKOTA AGRICULTURAL COLLEGE.

The work of the North Dakota Station during the past fiscal year has included soil investigations; chemical studies of corn, sugar beets, and human foods; veterinary investigations, with special reference to the effects of feeding millet to horses and the effect of tuberculin inoculation on dairy cows; investigations on plant diseases, especially smuts and potato scabs; bacteriological studies of dairy products; experiments in horticulture and forestry; field experiments with grains, grasses, and other forage crops, in rotation, and on the use of barnyard manure under the peculiar local conditions; and poultry experiments. A dairy herd and creamery have been maintained by the station and managed on a commercial basis, but very little experimental work has been done in this line, and a way should be found to relieve the station of the expenses attending this enterprise. Cooperative experiments on soil moisture and with sugar beets are being conducted, the latter in cooperation with this Department.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000.00
Farm products.....	2,448.78
Total.....	17,448.78

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 24-27.

Bulletin 24, pp. 16.—North Dakota Soils.—Results of analyses of a number of samples of soil taken from different sections of the State, with notes and comments on the same.

Bulletin 25, pp. 11, figs. 3.—Tree Culture.—A popular bulletin on the subject, giving directions for forest planting and subsequent care and descriptive notes on 18 varieties, largely compiled.

Bulletin 26, pp. 16.—Feeding of Millet to Horses.—Results of 2 tests made with horses to study the effect of feeding millet as a coarse fodder. Opinions of farmers concerning millet feeding for horses are also given.

Bulletin 27, pp. 52, figs. 13.—New Studies upon the Smut of Wheat, Oats, and Barley, with a Résumé of Treatment Experiments for the Last Three Years.—Embraces results of investigations on the following topics: Structural studies to determine the position and effects of the fungus upon the cells of the wheat plant; the wintering of the spores of stinking smut; effect of various methods of treatment upon seed grain; treatment of grain for field purposes; treatment of oats and barley for smut in 1896; effect of the date of seeding on the presence of smut in oats; amount of moisture absorbed by wheat in the course of treatment; apparatus for dipping purposes; on the swelling of grain after treatment; cost of treatment and a short bibliography of other experiment-station literature on the subject.

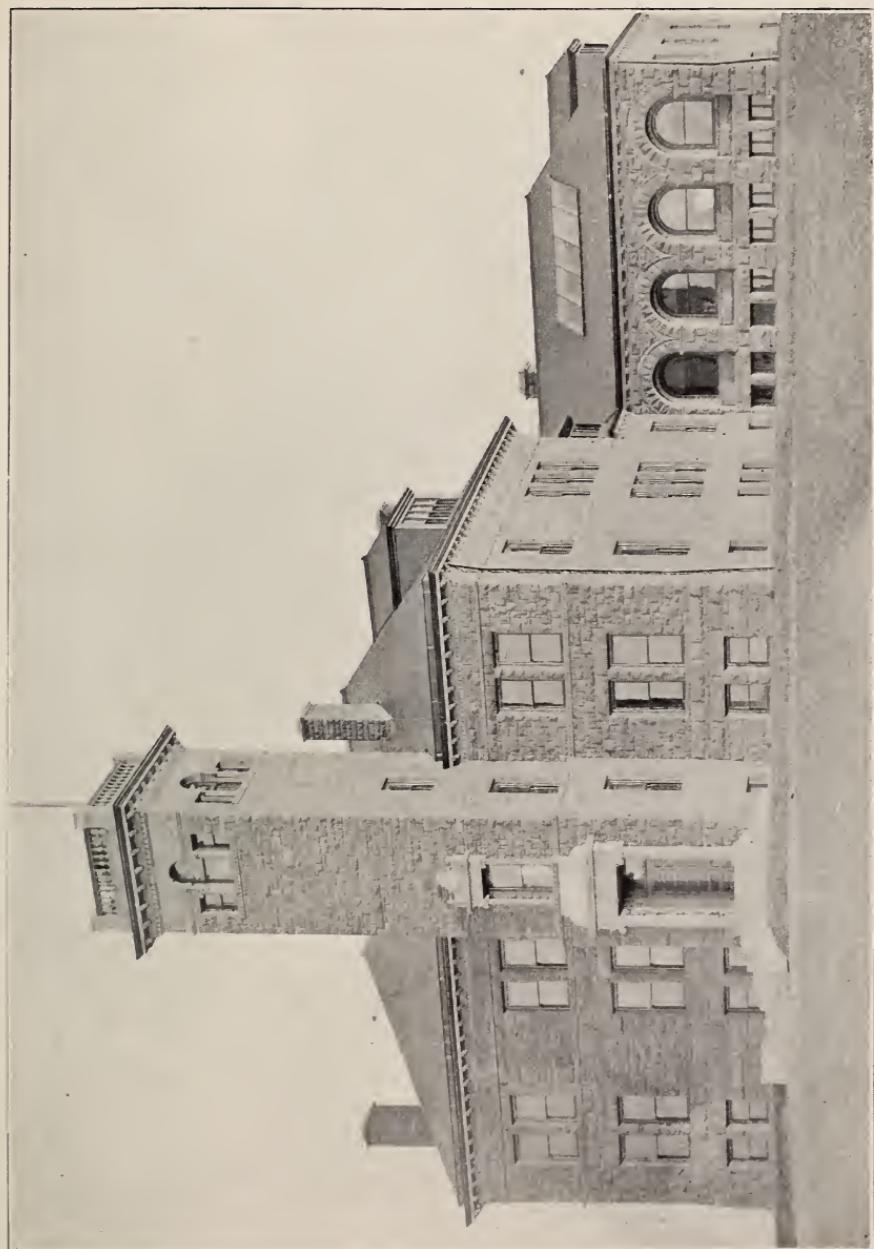
The work of the North Dakota Station has been actively prosecuted during the past year and investigations in a number of useful lines have been developed and strengthened. The college with which the station has been connected has prospered and the outlook of the whole institution is in the main decidedly encouraging. Caution will, however, need to be exercised in regard to farm and dairy operations which are mainly commercial and educational. If these are to be maintained by the college, the State should provide for them and they should not in any case be allowed to encroach on the funds given for experimental purposes. The recent dismissal of the experienced veterinarian and the appointment of an untried man in his place has awakened fears that the influences which hitherto have hindered the progress of the station are still at work. Unless meritorious training, experience, and efficiency are sufficient safeguards to make station workers secure in their positions, there is little hope that the station will do its full duty to the farmers of North Dakota.

OHIO.

Ohio Agricultural Experiment Station, Wooster.

The work of the Ohio Station during the past year, as heretofore, has included variety, fertilizer, culture, and rotation experiments with field crops, especially grain and forage crops; feeding experiments with dairy cattle, calves, and sheep; dairy experiments; horticultural investigations; studies of plant diseases and weeds, and entomological investigations. Special attention is being given to experiments on problems relating to the maintenance of the fertility of the soil. In this work nearly 800 tenth-acre plats are used, which are located in

FIG. 3.—NEW MAIN BUILDING OF OHIO AGRICULTURAL EXPERIMENT STATION.



five different counties, and represent soils of widely different origin. Numerous varieties of cereals, fruits, and vegetables are being tested. Five breeds of sheep are being compared with reference to their utility for meat production, taking into account the value of the wool. In horticulture, culture, fertilizer, crossing, rotation, and spraying experiments are in progress, in addition to the variety tests. In the greenhouse, subirrigation *versus* surface irrigation of tomatoes has been tried on a large scale. A three years' investigation of peach diseases is being closed up satisfactorily. In entomology particular attention has been given to the repression of chinch bugs and San José scale. A fire-proof stone building (fig. 3), providing offices, laboratories, library, museum, and assembly rooms has been completed with funds given by the State.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State (including balance from previous year)	53,435.49
Farm products	4,567.06
Total.....	73,002.55

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 66-79, Technical Bulletin No. 4, and the Annual Reports for 1895 and 1896.

Bulletin 66, pp. 11.—Meteorological Summary for 1895.—Notes on the weather, with tabulated meteorological observations for the year and comparisons with similar data for previous years from other parts of the State.

Bulletin 67, pp. 18.—Oats.—This embraces results of investigations on the percentage of smut in oats, a test of varieties at the station and substation, results of different methods of seeding, and of different methods of preparation of the seed bed.

Bulletin 68, pp. 42, maps 2, pls. 4.—Some Destructive Insects.—Popular notes and descriptions on 14 of the most destructive insects in Ohio, with suggestions as to remedies; results of an experiment to determine the effect on bees of spraying trees in bloom with the arsenites; and notes on the feeding habits of slugs.

Bulletin 69, pp. 21, figs. 3, pl. 1.—The Chinch Bug.—A popular review of the more important literature relating to the life history and distribution of the chinch bug, with the results of investigations at the station for its repression.

Bulletin 70, pp. 27, pls. 4.—Forage Crops.—General results of experiments with forage crops at the station since 1883, including methods of soil preparation, quantity of seed used, manner of growth, length of season required, and other data.

Bulletin 71, pp. 80.—The Maintenance of Fertility.—A discussion based on the results of experiments carried on at the station during a period of eight years on the amount of fertility removed from the soil by the average crops of corn, oats, wheat, timothy, and clover grown in a five-years' rotation; on the quantity and cost of fertilizers used in the State in 1894; on the most economical means of restoring the fertility removed in crops; on the sources and cost of fertilizing materials; the home-mixing of fertilizers, and on the results of investigations on the value of so-called "natural plant food," or soft phosphate.

Bulletin 72, pp. 30, figs. 11.—Peach Yellows, Black Knot, and San José Scale.—The distribution, symptoms, cause, effect, treatment, methods of spraying, and diseases mistaken for yellows are discussed, with similar notes on black knot and other contagious diseases of trees, together with descriptive, life-history, and remedial notes on the San José scale, and an appendix containing the Ohio black knot, yellows, and San José scale law.

Bulletin 73, pp. 25, figs. 5, pls. 4.—Investigations of Plant Diseases in the Forcing House and Garden.—A preliminary report upon investigations of diseases of lettuce, diseases caused by nematodes, leaf mildews, on spraying with fungicides under glass, and upon diseases of cucurbits and tomatoes.

Bulletin 74, pp. 14.—Notes on the Weather.—Tabulated daily and monthly observations at the station on temperature, precipitation, cloudiness, direction of the wind, etc., are given, and, for comparison, similar data for previous years from other parts of the State are added.

Bulletin 75, pp. 31, figs. 5.—Beet Sugar Production.—A reprint of Bulletin 55 of the Wisconsin Station, with additional notes on the cost of production.

Bulletin 76, pp. 16.—Potatoes.—Cultural notes, results of variety tests, and of experiments with fertilizers.

Bulletin 77, pp. 23, maps 4, figs. 7.—The Chinch Bug and Other Destructive Insects.—This gives the results of three years' study of an outbreak of the chinch bug in Ohio, together with notes and popular descriptions on 4 foreign insects.

Bulletin 78, pp. 44.—Corn.—Results of extended cultural investigations, comparative tests of varieties, and popular notes on corn smut and its treatment.

Bulletin 79, pp. 44.—Some Diseases of Orchard and Garden Fruits.—A popular bulletin, with spraying calendar supplement.

Bulletin, Vol. 1, No. 1, Technical Series, pp. 112, figs. 21.—A Preliminary List of Birds of Wayne County, Ohio.—Descriptive and critical notes are given of 83 species of birds known to inhabit this region, together with a hypothetical list of 82 others which are thought to be occasional visitors.

Annual Report, 1895, pp. 43.—This includes a brief report by the secretary of the board of control on the improvements and personnel of the station; report of the treasurer for the fiscal year ending June 30, 1895; report of the director on the season's crops, work of the station and substation, publications issued, and a list of donations made to the station; and reports of heads of station departments, including notes by the botanist on peach diseases, treatment of grain smuts, Ohio weeds, etc.

Annual Report, 1896, pp. 43, dgms. 6.—Reports by the board of control, director, and heads of departments on the work of the year, including data on the yield and acreage of farm crops at the station in 1896, and notes on injurious insects of the season; announcements as to the scope of the station work; an inventory of the station buildings, with floor plans of the main building and of the dairy barn; a list of publications issued and of donations and exchanges received during the year; and a financial statement for the fiscal year ending June 30, 1896.

The Ohio Station continues to enjoy the confidence and support of the State, which has largely supplemented the funds given by the United States. With the completion of its main building, the station

is in a better position than ever before to render efficient service to the agriculture of Ohio, and will be able to add a considerable amount of laboratory research to its extensive field and feeding experiments. The station is being managed on a consistent policy, and is developing its work on lines of great usefulness.

OKLAHOMA.

Oklahoma Agricultural Experiment Station, Stillwater.

DEPARTMENT OF OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE.

The work of the Oklahoma Station during the past year has included soil investigations, field experiments with wheat, oats, corn, Kafir corn, cotton, sugar beets, forage plants, and other crops; rotation experiments; feeding and breeding experiments with cattle and hogs; horticultural investigations; botanical and entomological studies; chemical examinations of corn, Kafir corn, alfalfa, castor beans, and irrigation and potable waters; studies of animal diseases. Cooperative experiments in connection with this Department have been conducted with sugar beets, Egyptian cotton, grasses and forage plants, and in forestry.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	680.18
Miscellaneous	526.38
Total	16,206.56

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of the station received during the past fiscal year were Bulletins Nos. 20-25.

Bulletin 20, pp. 23.—Wheat Experiments in 1895-96.—Feeding Value of Corn Scorched by Hot Winds.—Fruit Culture in Oklahoma.—Peach Rosette.—Melon Lice.—Results of station investigations and observations on these subjects.

Bulletin 21, pp. 16.—Experiments in Corn Culture, 1896.—Road Making and Repairing.—Results of culture experiments and variety tests with corn, with brief popular notes on road making and repairing.

Bulletin 22, pp. 13.—Climate and Crops in Oklahoma.—Field Experiments with Kafir Corn.—This includes meteorological observations on the temperature and rainfall, notes on various field crops, and the results of culture experiments with Kafir corn.

Bulletin 23, pp. 14.—Cotton Culture in Oklahoma.—Popular notes on the culture and possibilities of cotton in Oklahoma.

Bulletin 24, pp. 17.—Oklahoma Soil Studies.—Results of analyses and other studies of station soils, with popular notes on the importance of soil moisture, and a report on experiments made for its preservation.

Bulletin 25, pp. 8.—Loss by Exposure of Corn Stover.—Teosinte.—Composition of Pie Melon.—Fertilizer Analyses of Castor Bean Plants.—Results of investigations.

The Oklahoma Station has made definite progress during the past year in organizing its work on useful lines and within proper limits.

The addition to its staff of well-trained officers has enabled the station to perform more efficient service, and the reelection of the same staff for the ensuing year gives promise of making the station more stable and successful than hitherto. The field work of the station has been greatly improved and a definite division of college and station grounds has been made. The station funds have been economically expended in accordance with the provisions of the law, and the accounts have been kept in harmony with the schedules prescribed by this Department. It is hoped that this station will hereafter be able to maintain a consistent and permanent policy, and thus render services of increasing value to the agriculture of Oklahoma.

OREGON.

Oregon Experiment Station, Corvallis,

DEPARTMENT OF OREGON STATE AGRICULTURAL COLLEGE.

The work of the Oregon Station during the past year has included field experiments with cereals, forage plants, flax, sugar beets, and potatoes; experiments in the preservation of barnyard manure; feeding experiments; horticultural investigations, especially with prunes and other orchard fruits; entomological investigations, particularly on the prune twig borer, raspberry root borer, and a new apple scale; chemical studies on soils, grasses, and prunes, and on the nutritive value and digestibility of cheat as compared with clover. A new insectary has been provided for the entomologist.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000
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A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 43 and 44.

Bulletin 43, pp. 25, pls. 4.—Flax Culture.—A popular presentation of the possibilities and advantages of flax culture for Oregon, largely compiled.

Bulletin 44, pp. 49, figs. 13.—A Review of Oregon Sugar Beets.—Includes statistics, history of the industry, work done in the State and the particular results obtained, yield, and cost; together with extended notes on cultivation and manufacture.

The affairs of the Oregon Station during the past year have not been in a satisfactory condition. The station is doing some useful work, but the general policy of management of the college and station is not well established. At the close of the fiscal year the president and director was removed after one year's service. The horticulturist and assistant botanist were also removed. The station has been carrying too heavy a burden of farm operations, a considerable portion of which more properly belong to the college, and in general its work has been organized on too superficial a plan. A settled policy and increase in the thoroughness of the experimental inquiries are essential to the success of this station.

PENNSYLVANIA.

The Pennsylvania State College Agricultural Experiment Station, State College.

DEPARTMENT OF THE PENNSYLVANIA STATE COLLEGE.

The work of the Pennsylvania Station during the past year has been substantially along the same lines as heretofore, including chemical investigations of feeding stuffs and fertilizers; feeding experiments, especially with dairy cows and steers; poultry experiments; variety, culture, and fertilizer experiments with field crops, especially with tobacco; horticultural investigations, and meteorological observations. Special experiments in the culture and curing of tobacco have been continued in different localities in cooperation with the State department of agriculture. The value of the soil tests with fertilizers made under direction of the station was illustrated by the case of one farmer who found that "the intelligent as compared with the unintelligent use of fertilizers increased the profits of the potato crop nearly \$50 per acre." The importance of such tests in Pennsylvania is indicated by the fact that according to official estimates the farmers of that State annually spend about \$4,000,000 for fertilizers. The testing of horticultural varieties has been largely given up in order to afford greater opportunities for the study of special horticultural problems. During the past year the horticulturist has given his attention mainly to investigations relating to the peach industry. Besides a large amount of other experimental work relating to dairy farming, the station has since 1889 graded up its dairy herd "until its production now averages about 350 pounds of butter per year." The feeding experiments with dairy cows conducted at the station during the past three years have mainly been "a study of the relations which exist between the amount and composition of the food and the yield of milk and butter, particularly with reference to financial considerations." The station has been making special efforts to extend its influence more widely among the farmers of the State through regular and special publications and the farmers' institutes.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Fees for fertilizer analyses	8,535.17
Farm products	3,291.56
Total	26,826.73

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 35 and 36 and the Annual Report for 1895.

Bulletin 35, pp. 25.—A Soil Test with Fertilizers.—An account of a fertilizer experiment with potatoes on $\frac{1}{50}$ -acre plats, using nitrate of soda, muriate of potash, and dissolved bone black singly, two by two, and all three together, and compared with no fertilizer.

Bulletin 36, pp. 15.—Chestnut Culture for Fruit.—A popular bulletin containing general remarks upon the chestnut industry; the chestnut tree and its habits, native and foreign varieties, and culture.

Annual Report, 1895, pp. 349, figs. 4, pls. 9, dgms. 6.—Embraces the report of the treasurer, outline of the general work of the year, reprint of some tables and notes on rational stock feeding, previously published by the station; results of extended feeding experiments with milch cows; notes on the use of borax preservatives on cream-gathering routes; directions for using the Babcock milk test; notes on butter and butter substitutes, with results of analyses of a number of samples; feeding experiments with steers; notes on white *vs.* yellow varieties of corn; work with vegetables and fruits in 1894; descriptive notes on a number of apples grown in 1895; reprint of Station Bulletin 34; a paper on some Pennsylvania peats, with the chemical analyses of a number of samples; experiments with soluble, reverted, and insoluble phosphoric acid; general fertilizer experiments; composition of wood ashes sold in Pennsylvania; analyses of miscellaneous fertilizing substances; results of variety tests of a number of farm crops; a paper on the home birds of the State; list of exchanges, meteorological records of the year; soil temperatures for each month of the years 1894 and 1895, and the weekly crop reports for the same periods.

The Pennsylvania Station has been conducted during the past year on the same prudent and thorough policy as heretofore. While increasing its efforts to disseminate useful information among the farmers, it has continued carefully planned investigations along a few well-chosen lines of great importance to the agriculture of the State. The importance of the agricultural interests of Pennsylvania, as related to its wealth, would seem to warrant more generous provision on the part of the State for the development of scientific and practical inquiries such as this station might successfully and economically prosecute if its financial resources were enlarged.

RHODE ISLAND.

Rhode Island Agricultural Experiment Station, Kingston.

DEPARTMENT OF RHODE ISLAND COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

The Rhode Island Station has continued work mainly in the same lines as heretofore, including fertilizer analysis and inspection; chemical and agricultural investigations on the use of fertilizers; variety, fertilizer, culture, and rotation experiments with grain and forage plants; horticultural investigations and studies of plant diseases; experiments in oyster culture and with poultry. The fertilizer experiments have had special reference to the use of lime and the substitution of soda for potash. Cooperative experiments are conducted in ten different places in the State. A vegetation house has been built for use in investigations with fertilizers, and a greenhouse is being utilized in the winter for studies on the preparation and manuring of soil for garden vegetables. In horticulture, special attention is being paid to lettuce, peaches, and the Loganberry. A laboratory for summer work on oyster culture has been built in the vicinity of Kingston, and an attempt is being made to revive the oyster industry, which was once important in this locality. Experiments with geese have been continued, and the raising of Belgian hares has been introduced with a view to comparing the cost of meat from this source and from poultry. By a State law enacted last winter the selection of an analyst for the fertilizer control was left to the State board of agriculture. This has resulted in the removal of fertilizer analysis from the station.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State	2,856.54
Farm products	2,429.73
Miscellaneous	1,214.07
Total	21,500.34

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 37-45 and the Annual Report for 1895.

Bulletin 37, pp. 15, figs. 8.—Apple Culture.—Popular directions for the cultivation and care of established orchards.

Bulletin 38, pp. 10, figs. 5.—The Bordeaux Mixture.—Report on the successful use of Bordeaux mixture in combating the late blight of potatoes.

Bulletin 39, pp. 8.—Analyses of Commercial Fertilizers.—A Schedule of Trade Values of Fertilizing Materials.—Notes on valuations and tabulated analyses and valuations of 41 samples of fertilizers.

Bulletin 40, pp. 26, pls. 2.—Fertilizers.—Potato Scab.—Includes tabulated analyses and valuations of 60 samples of fertilizers and the results of investigations on the effect of various substances on the growth of potato scab.

Bulletin 41, pp. 33, figs. 14.—Spinach.—Notes on spinach culture in Rhode Island, with a classification and description of the various varieties; results of irrigation experiments; brief notes on the leaf miner and mildew of spinach, an historical sketch of the cultivation and use of spinach, and directions for cooking.

Bulletin 42, pp. 18.—Fertilizers.—Analyses and valuations of 100 samples of fertilizing materials and of 5 home mixtures, and a brief discussion on the value to the State of the fertilizer control.

Bulletin 43, pp. 13.—Additional Tests of Garden Seeds.—Results of tests of 151 samples of vegetable seeds with notes and comments.

Bulletin 44, pp. 46, figs. 19.—Celery.—Results of experiments in level vs. trench culture; notes on diseases; a study of 59 varieties to note their development during the last fifty years, and an historical sketch of celery culture.

Bulletin 45, pp. 16, figs. 8.—The Loganberry.—Cultural and historical notes on the Loganberry with an account of its growth at the station and suggestions as to best methods of propagation.

Annual Report, 1895, pp. 200, xv. figs. 47.—Report of the director on the work of the year; investigations upon the growth of various plants on upland acid soil before and after liming; substitution of soda for, and its value in connection with, potash; a paper based upon experiments at the station and elsewhere on the recognition of the acidity of upland soils and its bearing upon agricultural practices; ammonium thiocyanate as an impurity in ammonium sulphate; fertilizer inspection and analyses; analyses of 12 samples of water; report on two methods of heating greenhouses; shrinkage experiments with Indian corn; notes on forage plants; results of growing leguminous and other plants with different quantities of nitrogen and without nitrogen; three seasons' experiments with geese; meteorological records of the year; lists of exchanges and donations; and the report of the treasurer for the fiscal year ending June 30, 1896.

The work of the Rhode Island Station is wisely confined to a few

lines and is increasing in thoroughness and efficiency. Valuable results have already been attained in matters which relate to intensive farming and horticulture, and the outlook is promising for the development of the station's work in this direction.

SOUTH CAROLINA.

South Carolina Agricultural Experiment Station, Clemson College.

DEPARTMENT OF CLEMSON AGRICULTURAL COLLEGE.

The work of the South Carolina Station during the past year included chemical studies of soils, phosphate rock, waters, milk, sweet potatoes, and sea-island cotton; variety, fertilizer, and rotation experiments, especially with corn and cotton; horticultural experiments; work in dairying; botanical studies, including investigations in vegetable physiology and pathology, and investigations on diseases of animals. The analysis and inspection of fertilizers is carried on at the college under State laws and with funds provided by the State. The station has cooperated with this Department in experiments in forestry and with sugar beets.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000.00
Farm products.....	377.53
Total.....	15,377.53

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 25-27 and the Annual Report for 1896.

Bulletin 25, pp. 11.—Distemper in Horses and Mules.—A popular bulletin on the diagnosis, treatment, and prevention of influenza and strangles.

Bulletin 26, pp. 16.—Founder in Horses and Red Water in Cattle.—Popular notes on the prevention, diagnosis, and treatment of these diseases.

Bulletin 27, pp. 8.—Wounds and Their Treatment.—Popular notes on this subject.

Annual Report, 1896, pp. 16.—Brief reports by the director and heads of departments on the work of the year, including some miscellaneous chemical analyses; lists of bulletins published; donations to the station, and a financial report for the fiscal year ending June 30, 1896.

Progress was made during the past year in strengthening the work of the South Carolina Station. The facilities for experimental inquiries in veterinary science and vegetable physiology and pathology were materially improved, and useful investigations in these lines and in chemistry were undertaken. Unfortunately, at the close of the fiscal year changes occurred in the positions of director and agriculturist from causes beyond the control of the governing board. New officers have entered upon their duties in these positions, and it is hoped that success will attend their undertakings. The policy of the station has tended too much in the direction of educational work, as is indicated by the statement in the report of the director for 1896, that "the station is rapidly becoming a sort of farmers' correspondence

school, and is destined in time to become a bureau of information to which our citizens may turn for help on all agricultural questions." The Hatch Act was not intended to create "bureaus of information," but experiment stations. The State of South Carolina needs thorough original investigations for the promotion of its agriculture, and it should be the chief business of its experiment station to conduct such investigations. The station still needs strengthening on this side, and it is hoped that every effort will be made to develop experimental inquiries which will promise results of general value to the farmers of the State.

SOUTH DAKOTA.

South Dakota Agricultural Experiment Station, Brookings.

DEPARTMENT OF SOUTH DAKOTA AGRICULTURAL COLLEGE.

The work of the South Dakota Station during the past year has included field experiments with wheat, millet, corn, and forage crops, and with barnyard manure; soil investigations; chemical studies of forage plants and sugar beets; investigations in horticulture and forestry; botanical studies of grasses and other economic plants; investigations on injurious insects and plant diseases; and biological studies with special reference to animal diseases. Cooperative experiments have been conducted in the James River Valley, including investigations relating to the practice of irrigation. The station has cooperated with this Department in work in forestry and with grasses and sugar beets. The facilities of the station have been improved and will soon be still further enlarged through the remodeling of a building which will be set apart for the station officers and laboratories.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
State.....	700.00
Farm products	466.05
Total.....	16,166.05

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 46-52 and the Annual Reports for 1894, 1895, and 1896.

Bulletin 46, pp. 18, dgms. 2.—Building Creameries and Organization of Cooperative Creamery Companies.—Articles of incorporation and by-laws of a creamery, together with plans and equipment for a creamery building.

Bulletin 47, pp. 46.—Tomatoes, Beans, Onions.—A Cheap Hot-house.—Results of variety tests and of culture and fertilizer experiments with these crops, and a reprint of an article from "Market Garden" on a cheap and efficient greenhouse for the Northwest.

Bulletin 48, pp. 18, figs. 5.—Potato Scab.—Three Injurious Insects.—Results of investigations with three fungicides for the prevention of potato scab, and illustrated and descriptive notes on three injurious insects.

Bulletin 49, pp. 24, map 1.—Shallow Artesian Wells of South Dakota.—Notes are given on a number of artesian wells in different portions of the State, with results of mineral analyses of the waters from these wells and of the water from one surface well.

Bulletin 50, pp. 40.—Fruit Culture.—A popular bulletin intended to serve as a guide to the planters in the State. Orchard and small fruits are discussed, and the results secured at the station detailed. Reports from fruit growers in various parts of the State are also given.

Bulletin 51, pp. 32, figs. 6.—Forage Plants for South Dakota.—Silos and Silage.—Cultural notes and results of variety tests with a number of forage plants, with popular notes on the value of silos and silage and descriptive notes on the station silo.

Bulletin 52, pp. 32, pls. 11.—Irrigation in South Dakota.—A report on irrigation experiments with a large number of farm and garden crops.

Annual Report, 1894, pp. 34, appendix 208.—Financial report, reports by the director and heads of departments on work of the year, including meteorological observations, variety tests of farm crops, breeding experiments with sheep and swine, and reprints of station bulletins 37-40.

Annual Report, 1895, pp. 22, appendix 151.—Treasurer's report, outlines of the work of the year and of proposed experiments, and reprints of Bulletins 41-44.

Annual Report, 1896, pp. 32.—Report by the director and heads of departments on the work of the year, and a financial statement for the fiscal year ending June 30, 1896.

The South Dakota Station was much harassed during the past year by uncertainties growing out of a legal conflict over an amendment to the constitution of the State which abolished the subsidiary governing board, known as the board of trustees, and put the entire management of the college and station in the hands of the board of regents of education. The point at issue was the right of the governor of the State to appoint a new board of regents to take the place of the board in office at the time the amendment was voted on by the people. The supreme court of the State finally decided in favor of the new board, but this decision was not reached until after the close of the fiscal year. The general effect of this concentration of authority in a single board will, it is believed, be greatly to the advantage of the institution by removing many causes of friction arising from the undefined limits of the functions of the two boards previously existing. The members of the new board are appointed for terms of different length, the object being to secure a nonpartisan board. The board has given assurances that political considerations will not affect its action, and has thus far been quite conservative in its dealings with the station.

Considering the peculiar conditions surrounding the station, the activity which characterized its operations during the past year is much to be commended. The publications of the station which had fallen into arrears were brought up to date, the expenditures and accounts were put on a proper basis, and much useful work was done in the fields and laboratories. The outlook for the successful management of the station is much better than it was a year ago, and if a consistent and permanent policy can be maintained, there is good reason to believe that the station operations will be materially developed and strengthened in the near future.

TENNESSEE.

Tennessee Agricultural Experiment Station, Knoxville.

DEPARTMENT OF THE UNIVERSITY OF TENNESSEE.

The work of the Tennessee Station during the past year has been mainly along the same lines as heretofore, including variety, fertilizer, and culture experiments with leguminous forage plants, grasses, grains, and sugar beets; feeding experiments with milch cows; chemical studies of Southern feeding stuffs, especially of cotton seed and its products; horticultural investigations, especially on the varieties of fruits originating in Tennessee, the forcing of lettuce in the greenhouse, and the growth of pear trees; botanical studies, especially on the effects of fungicides on peach foliage; and entomological investigations, particularly on plant lice and the San José scale. In cooperation with this Department, the station has continued the maintenance of a grass garden covering about 10 acres, in which numerous varieties of grasses are being tested, and has undertaken experiments with sugar beets. A vineyard has been planted on the farm which will be used for experiments in the culture and pruning of grapes with special reference to conditions existing in the State. An interesting exhibit of the work of the station was made at the Nashville Exposition and attracted much attention. Advantage was taken of the opportunity afforded by this exhibit to prepare a large and handsome relief map of the State showing the various typical soils, based on the distribution of geological formations. The station staff was aided in this work by the Division of Soils of this Department, the United States Geological Survey, and the State geologist of Tennessee. A bulletin containing a copy of this map and much useful information regarding the agricultural value of the soils of the State will be issued by the station. It is believed that this will be of great advantage to the station as an aid to the future development of its experimental inquiries. The analysis of commercial fertilizers, until recently made by the station for the State bureau of agriculture, has been discontinued. The station is thus relieved of a considerable amount of routine work, but its funds are somewhat reduced.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Fees for fertilizer analyses	499.00
Farm products	541.44
Total	16,020.44

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins, Vol. 9, Nos. 1-4; Vol. 10, Nos. 1-2, and the Annual Report for 1896.

Vol. 9, Bul. 1, pp. 34, figs. 20.—Apples of Tennessee Origin.—A study of the seedling apples of the State, with descriptions and illustrations of a number of the most valuable, and historical data on two varieties.

Vol. 9, Bul. 2, pp. 13, pls. 6.—Strawberries.—Tabulated data and descriptive notes on 54 varieties grown at the station and a list of the most satisfactory sorts grown in different sections of the State.

Vol. 9, Bul. 3, pp. 114.—Contributions to the Study of Southern Feeding Stuffs.—Results of chemical and physical examinations of a large number of feeding stuffs; compiled table of analyses of Southern feeding stuffs; a comparison of the average composition of Southern with the average of American feeding stuffs; brief discussion of the practical use of feeding-stuff analyses; and tables of factors of digestibility.

Vol. 9, Bul. 4, pp. 29, figs. 10.—Varieties of Grapes.—A report is given on 70 varieties tested in 1896, 63 of which were grown at the station. Two new varieties of merit are reported upon at length and illustrations given of 10 desirable sorts for planting in Tennessee.

Vol. 10, Bul. 1, pp. 18, figs. 15.—Apples of Tennessee Origin (Second Report).—Descriptive notes on 19 varieties of seedling apples of merit, originated in Tennessee, with historical data in some cases.

Vol. 10, Bul. 2, pp. 10, figs. 5.—Pot Cultures of Lettuce.—Methods and results secured at the station in growing lettuce in pots under glass and in marketing the same.

Annual Report, 1896, pp. 20.—Brief reports by the heads of Departments on the work of the year, including notes on certain plant diseases in Tennessee; a bibliography of the station literature since its establishment in 1888; and a financial report for the fiscal year ending June 30, 1896.

The Tennessee Station has steadily pursued its work during the past year in accordance with the policy previously determined upon. It is being carefully and methodically managed and its operations are planned with reference to the general interests of the agriculture of the State. The labor imposed by the carrying on of the farm, while prudently and economically bestowed, is still a heavy burden on the station, and the financial aid of the State is needed to relieve it in this direction and to make possible further extension of its experimental inquiries.

TEXAS.

Texas Agricultural Experiment Station, College Station.

DEPARTMENT OF THE STATE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS.

The work of the Texas Station during the past year has included field experiments with corn, cotton, grain and forage crops, and canaigre; feeding experiments with milch cows and hogs; chemical investigations, especially on canaigre and on the soils of the coast region; horticultural investigations, especially on peaches and potatoes, and studies in veterinary science and practice. The substations at Beeville, in southern Texas, has been maintained mainly with State funds. Special investigations have been made on a disease affecting pear trees in the coast region. The facilities for work in dairying have been improved.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000
State appropriation for substations	2,500
Total	17,500

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department.

The publications of this station received during the past fiscal year were Bulletins 38-40 and a preliminary report on field experiments for 1895.

Bulletin 38, pp. 9, figs. 7.—Canaigre, the New Tanning Plant.—Description of the plant, notes on propagation, culture, drying, etc.; analyses of 70 samples of cultivated and wild roots at different stages of growth and of 2 samples of canaigre soils; testing of 2 methods of analysis; and remarks on the crop as a commercial industry.

Bulletin 39, pp. 46, figs. 30.—The Peach.—A comprehensive bulletin on this fruit, treating of varieties, their classification, those adapted to different climates, rules of nomenclature, peaches recommended by different Texas horticulturists, directions for orchard setting and budding, and notes on fungus diseases and injurious insects.

Bulletin 40, pp. 24.—Corn, Cotton, and Forage Plants.—Results of variety tests of these crops.

Preliminary Report, pp. 7.—Field Experiments for 1895.—Tabulated results of variety tests with cotton and corn.

The work of the Texas Station has been strengthened during the past year, and the relations of the college and station have been more clearly defined. The station has pursued a conservative policy in the extension of its work to different localities of the State. The small appropriation made by the State has enabled it to maintain only one substation. Useful special investigations have, however, been conducted in a number of places.

UTAH.

Agricultural Experiment Station, Logan.

DEPARTMENT OF THE AGRICULTURAL COLLEGE OF UTAH.

The work of the Utah Station during the past year has included variety, rotation, and irrigation experiments with cereals and other crops; feeding experiments with dairy cattle, pigs, and poultry; investigations in dairying, especially butter making and cheese making; horticultural and forestry experiments; investigations in irrigation engineering; field and chemical studies of alkali soils, sugar beets, and alfalfa; investigations of animal diseases. Work in entomology has recently been undertaken. The investigations in irrigation, with special reference to the water supply of Utah and the best means for utilizing it in agriculture have been energetically and successfully prosecuted in cooperation with the United States Geological Survey and county officials. The chemical and other studies of alfalfa made by this station have been of general value for a wide region. Co-operative experiments in forestry and with sugar beets have been conducted in connection with this Department.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	3,555.05
Miscellaneous	471.88
Total	19,026.93

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of the station received during the past fiscal year were Bulletins Nos. 43-49 and the Annual Reports for 1895 and 1896.

Bulletin 43, pp. 64, pls. 4.—*Dairy Notes.*—This embraces the dairy-herd record for 1894 and 1895, results of feeding experiments with dairy cows, and some suggestions on the building and equipment of factories.

Bulletin 44, pp. 33.—*Alfalfa or Lucern.*—Report on the yield and feeding value of early, medium, and late cuttings; yield and feeding value of the first, second, and third cuttings, as shown by feeding experiments with steers; and the feeding value as compared with red clover, timothy, mixed hay, and alfalfa mixed with straw.

Bulletin 45, pp. 19.—*Experiments with Vegetables and Fruits.*—A report is given on the results of culture experiments; variety tests on onions, potatoes, beans, sweet corn, etc., with descriptive notes on a number of varieties of orchard fruits, and on the use of certain insecticides for the repression of the codling moth.

Bulletin 46, pp. 56, pl. 1, figs. 14.—*Earthen Dams.*—A discussion of the character of material used in earthen dams, methods of making compact embankments and of constructing core walls, the dimensions of reservoir embankments, slope paving, outlet pipes and conduits, wasteweirs or overflows, and State supervision of dams and reservoirs. Results are given of experiments at the station to determine the best proportion in which to mix gravel, sand, silt, and clay in order to produce the most compact and impervious mass. The Connecticut and Idaho laws relating to dams and reservoirs are given in an appendix.

Bulletin 47, pp. 58, figs. 8, charts 4.—*Climate of Utah.*—A summary is given of observations on temperature, pressure, humidity, precipitation, etc., at 12 stations in the State during 1896; and the climate of the State, as indicated by the averages of observations during the five years ending with 1895, is discussed.

Bulletin 48, pp. 75, dgms. 12.—*Alfalfa or Lucern; Its Chemical Life History.*—Results are given of analyses of a number of samples of alfalfa—whole plant, leaves, stalks, and flowers of the first, second, and third crop—and of the first, second, and third crop alfalfa hay. The relative value of the different parts of the plant from different crops is discussed, as well as the proper time of cutting alfalfa hay.

Bulletin 49, pp. 26, figs. 12.—*Spraying.*—Popular notes on spraying for the repression of insects and fungus diseases, with brief notes and illustrated descriptions of spraying apparatus.

Annual Report for 1895, pp. 5.—Treasurer's report for the fiscal year ending June 30, 1895, and abstracts of bulletins issued.

Annual Report for 1896.—A financial statement for the year ending December 31, 1896.

The affairs of the Utah Station have been in a more or less unsettled condition during the past year. The president of the college, the director and agriculturist, and the horticulturist, being newly appointed officers, have necessarily given a large share of their time to studying the general conditions under which experiment-station work can be carried on in Utah. After a few months' service the horticulturist resigned, thus making necessary a further reorganization of the work in this department. Recently the veterinarian has also resigned to accept a position at the Kansas Station. A readjustment on a more equitable basis has been made of the salaries of officers employed in both station and college, as recommended last year by this office. This station is doing considerable useful work and has great opportunities for efficient service in behalf of the agriculture of a wide region. But until the uncertainty is removed which now character-

izes many of its operations and which is apparently due in large measure to the temporary tenure of its officers, it can not be said that the station is economically and efficiently managed.

VERMONT.

Vermont Agricultural Experiment Station, Burlington.

DEPARTMENT OF UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE.

The work of the Vermont Station during the past year has been mainly along the same lines as heretofore, including analysis and inspection of commercial fertilizers; chemical studies of fertilizers and potatoes; feeding experiments with pigs and milch cows; variety and fertilizer experiments with forage crops; investigations on plant diseases, especially those affecting potatoes and apples, and on weeds, especially the orange hawkweed; investigations in horticulture and forestry, especially on plums, including the problems of pollination; entomological studies, particularly on the "red spider;" and experiments in bee keeping. Experiments with sugar beets are being made in cooperation with this Department.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000.00
Fees for fertilizer analyses.....	1,911.67
Farm products	3,055.30
Total.....	19,966.97

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 53-59 and the Annual Report for 1895.

Bulletin 53, pp. 17, figs. 6.—The Pollination of Plums.—A brief discussion upon the general relationship of cross fertilization and fruitfulness; results of an examination of over 2,000 plum blossoms, with reference to defective pistils; experiments in protecting 25 to 300 blossoms of each of 14 varieties of plums from cross fertilization; 21 crossing experiments with 22 varieties, 319 pollinations being made; and a conspectus showing the relationships of the various groups of plums.

Bulletin 54, pp. 15, figs. 8.—Salad Plants and Salads.—General considerations and illustrative and descriptive notes on several varieties, with remarks on the preparation of salads for the table.

Bulletin 55, pp. 12, figs. 9.—Apple Growing in Green Isle County.—Information relative to the apple industry in this section—statistics for the crop of 1896; methods of culture is vogue; favorite varieties; packing, storing, marketing, storage houses, etc.

Bulletin 56, pp. 15, figs. 5.—Orange Hawkweed or "Paint Brush."—Popular notes on the nature and occurrence of this weed, with results of experiments in cultivation and with salt for its repression.

Bulletin 57, pp. 31.—Analyses of Commercial Fertilizers.—Brief notes on valuation of fertilizers; list of fertilizer firms licensed under the provisions of the State fertilizer law; and tabular analyses and valuation of 35 samples of fertilizers.

Bulletins 58, pp. 13; 59, pp. 30.—Statements regarding the collection of samples; list of companies licensed to sell fertilizers in the State; notes on valuation and tabulated analyses and valuations of 158 samples of fertilizing materials.

Annual Report, 1895, pp. 237.—Report of the director on the work of the year; abstracts of Bulletins 45–49; analyses of miscellaneous fertilizers and drinking waters, with notes on the consumption of fertilizers in Vermont; results of a study of the kinds, chemical composition, cost, etc., of commercial feeds in the State; pig-feeding experiments; investigations on potato blights; methods of preparation of Bordeaux mixture and field tests of the same; disinfection of seed potatoes; orchard diseases and remedies; work on oat smut; notes on the hawkweed; report on the insect pests of the year, with illustrated, descriptive, and remedial notes on a number of the more injurious insects; notes on the method of least squares as a means of determining the money value of commercial feeds, and the results secured when applied to Vermont feeding stuffs; extensive dairying experiments, covering a study of the variations in milk, record of the station herd for 1894 and 1895, tests of dairy apparatus, fast and slow milking, miscellaneous fodder crops, with analyses of the same, and feeding tests.

The Vermont Station has continued its work actively during the past year, and the investigations in charge of its expert officers are being conducted in a thorough and progressive way. The botanical division has greatly improved facilities in the new science building of the university and the chemical laboratory has been reconstructed. The college has assumed a portion of the expense connected with the work in dairying hitherto borne by the station, but there is still need of curtailment of the farm operations in view of the limited resources of the station. It appears from the report of the director for 1896–97 that, though "no State funds are appropriated to the station for any purpose whatsoever," an increasing number of routine analyses of miscellaneous agricultural materials are made for private individuals by the station under a State law. The State for a time made an appropriation for this work, but withdrew financial aid in 1890. The United States funds are not properly used for this purpose, and in the absence of a State appropriation specifically for this work it should not be allowed to be a hindrance to the investigations for the public benefit for which the station is maintained.

VIRGINIA.

Virginia Agricultural and Mechanical College Experiment Station, Blacksburg.

DEPARTMENT OF VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE.

The work of the Virginia Station during the past year has included horticultural investigations, studies of plant diseases, botanical and entomological investigations, chemical studies of staple crops, investigations on animal diseases, and field experiments with grain and forage crops. The horticultural work of the stations includes extensive tests of varieties of fruits and vegetables, experiments with different methods of culture, and with fungicides and insecticides. The studies on the chemistry of potatoes, tobacco, and other crops are of general importance. The farm operations of the station are not thoroughly satisfactory for experimental purposes. The station needs to be relieved from the care of so large a tract of land and from commercial considerations attending its management. Buildings and other facilities for feeding experiments are greatly needed, and it is hoped that the State will supply these at an early day. Under State laws

the station officers are engaged in the repression of the San José scale and animal diseases.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	3,184.76
Miscellaneous	427.25
Total.....	18,612.01

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 57-62 and the Annual Report for 1895-96.

Bulletin 57, pp. 18, figs. 6.—The Utilization of Unmerchantable Apples.—Results of investigations on the manufacture of apple cider, jelly, marmalade, and vinegar.

Bulletin 58, pp. 8, figs. 3.—A New Plan for the Construction of a Storage Cellar.—A detailed description is given of the station cellar, with the results of a series of observations on the range of temperature in the cellar during November, December, and January.

Bulletin 59, pp. 6.—Experimental Garden Notes, I.—Popular notes on the culture of tomatoes in the field and under glass, and on celery.

Bulletin 60, pp. 14.—Experimental Garden Notes, II.—Popular notes on the culture of onions, early garden peas, etc., and on the construction and management of a hotbed.

Bulletin 61, pp. 8.—Splenetic or Texas Cattle Fever.—General information on the nature, cause, and prevention of this disease, including the text of the State law on the subject.

Bulletin 62, pp. 14, figs 5.—The San José or Pernicious Scale.—Popular notes on the introduction and occurrence of this insect, its habits, life-history, food plants, etc. The text of the State law concerning the scale is appended.

Annual Report, 1895-96, pp. 13.—Brief reports by the director and heads of departments on the work of the year, including a table showing meteorological conditions for the year ending June 30, 1896, and a financial statement for the same period.

The Virginia Station is doing considerable useful work. The college with which the station is connected is prospering, and this will ultimately be to the advantage of the station. The special efforts made to reach the farmers of the State through popular bulletins are believed to be materially strengthening the station. Under the present policy the foundation is being laid for the development of the station's researches, and with the aid of the State the station may easily devote itself to more thorough investigations, especially as related to field crops and the feeding of animals.

WASHINGTON.

Washington Agricultural Experiment Station, Pullman.

DEPARTMENT OF WASHINGTON AGRICULTURAL COLLEGE AND SCHOOL OF SCIENCE.

The work of the Washington Station during the past year has included chemical investigations of soils and sugar beets; field experiments with sugar beets, grain, and forage crops; feeding experiments; horticultural investigations; studies of plant diseases and injurious

insects. Special investigations are being made of the bacteriological diseases of the ground squirrel, with a view to finding some method of destroying this injurious rodent. The substation at Puyallup has been discontinued until such time as the State shall provide funds for its maintenance. Experiments with sugar beets are being conducted in cooperation with this Department.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	943.92
Total	15,943.92

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 21-28.

Bulletin 21, pp. 8.—Susceptibility of Spermophiles to Pathogenic Bacteria.—Results of inoculation experiments with squirrels and birds.

Bulletin 22, pp. 10.—Influenza.—A popular article giving synonyms and discussing the cause, symptoms, forms, and treatment of this disease among horses.

Bulletin 23, pp. 19.—Some Notes Concerning the Nitrogen Content of Soil and Humus.—Investigations relative to the importance of humus in the soil are briefly reviewed and analyses are reported of 53 samples of soil from 16 counties in the State.

Bulletin 24, pp. 7, fig. 1.—An Acid Test for Milk and Cream.—A description is given of a method of using Farrington's alkaline tablets in testing the acidity of milk, and a graduate by the author for testing milk is illustrated.

Bulletin 25, pp. 27, figs. 11.—Pruning Orchard Trees.—Popular illustrated notes on this subject, with a list of the varieties of fruits now growing at the station.

Bulletin 26, pp. 36.—Experiments in the Culture of the Sugar Beet in Washington for 1895 and 1896.—A report is given on the results of 14 cooperative experiments in the culture of the sugar beet, together with analyses with reference to sugar content and percentage purity of a large number of samples.

Bulletin 27, pp. 48, figs. 69.—A Few Facts about Insects.—Popular illustrated descriptive life-history and remedial notes on the more common of a number of orders of insects, together with formulas for the preparation of 12 insecticides.

Bulletin 28, pp. 17, fig. 1.—Clearing Land.—Popular notes on the methods and cost of clearing land at the station.

The Washington Station has continued its work mainly along the same lines as heretofore, and its affairs have been conducted in an orderly way with a view to giving practical aid to the farmers of the State. Recently, through changes in its governing board, the college and station have been in a disturbed condition, but it is hoped that nothing will occur to prevent the maintenance of a consistent policy of station work. It does not yet seem to be fully understood by the community in which the station is located that the funds given by the United States for the station are for experimental purposes only, and that they can not lawfully be applied either directly or indirectly to general college purposes. Whenever persons are employed in both college and station, or farm operations or other enterprises are conducted for the benefit of the college as well as the station, a fair

division should be made of the expenses incurred, so that the station will be charged with only so much as was actually expended for experimental purposes. It is the duty of the State to provide the land, buildings, and other equipment of the institution, in so far as the Federal laws forbid expenditures for these purposes, and to pay salaries or other expenses not provided for in these laws. Temporary financial distress in the State does not justify any encroachment on the Federal funds given for specific purposes.

WEST VIRGINIA.

West Virginia Agricultural Experiment Station, Morgantown.

DEPARTMENT OF THE WEST VIRGINIA UNIVERSITY.

The work of the West Virginia Station during the past year has included fertilizer analysis and inspection; chemical studies, especially of potatoes; field experiments with potatoes, grasses, forage crops, and fertilizers; feeding experiments with pigs; poultry experiments; horticultural investigations; studies of plant diseases, and entomological investigations, especially on forest insects. Much attention was given to organizing field and feeding experiments on the farm purchased about a year ago for the station. Poultry experiments were begun on a somewhat extensive scale with a view to testing different breeds of fowls and conducting investigations on methods of feeding and breeding. The entomological work with reference to forest insects is very important in view of the large timber interests of the State, and is being prosecuted with great energy. Some interesting studies are being made on varieties of timothy and red clover, the special object being to develop varieties which will ripen at the same time. The horticulturist is continuing greenhouse and laboratory investigations, which include important studies in plant physiology and pathology. Especial attention is being given to studies relating to apples, particularly in the northwestern part of the State. Cranberry experiments are being carried on in Preston County. The expenses connected with the development of the farm operations of the station have been quite large. The State has contributed \$2,000 toward the purchase of land and the equipment of the farm, but unless the State continues to aid the station it will be difficult for it to maintain its field and feeding work on the scale on which it has been planned without detriment to the other lines of investigation in which the station has engaged and which are of great importance to the State.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000.00
Fees for fertilizer analyses.....	5,452.72
Farm products.....	145.15
Miscellaneous.....	137.46
 Total.....	 20,735.33

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by the Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 44 and 45 and one Special Bulletin.

Bulletin 44, pp. 78.—Practical Entomology.—Insects Injurious to Farm and Garden Crops, Character of the Injury, the Insect Caus-

ing It, and the Remedy.—A popular bulletin on these subjects designed for the use of farmers.

Bulletin 45, pp. 70, figs. 22.—Chickens.—A popular bulletin on the breeding, care, and feeding of chickens; parasites, diseases, etc.

Special Bulletin (folio).—Fertilizers.—Tabulated analyses and valuations of 204 samples of fertilizers.

The work of the West Virginia Station was earnestly and successfully prosecuted during the past year. Much effort was necessarily given to the organizing of new lines of work. Great harmony prevailed in the station staff, and the grade of work done was, on the whole, higher than that previously attained. Near the end of the year, however, the appointment of a new governing board of nine members, only one of whom had served in that capacity before, brought about the removal of the director. After some nine years of faithful service, during which period he had managed the station successfully under unusual difficulties arising very largely from misconceptions of the proper functions of an experiment station existing in the community in which the station is located and strongly affecting the action of the governing boards, and after having brought the station to a high state of efficiency as regards both its practical and scientific work, the director was dismissed by the board at its first meeting, though no charges affecting his personal or professional standing were preferred. Such an apparent violation of sound principles of station management should not, in my judgment, be allowed to pass without an earnest protest. It is action of this kind on the part of boards charged with the general management of the stations which more than anything else weakens our experiment stations, discourages their officers, and leads to the substitution of superficial and temporary operations for those thorough investigations which can be carried on only by men secure in their positions as long as they are efficient in their work. Under existing laws this Department can do comparatively little toward preventing the waste of the United States funds given for experiment station purposes unless governing boards base their action on sound business principles and make fitness and efficiency the fundamental tests in the appointment and retention of station officers.

WISCONSIN.

Agricultural Experiment Station of the University of Wisconsin, Madison.

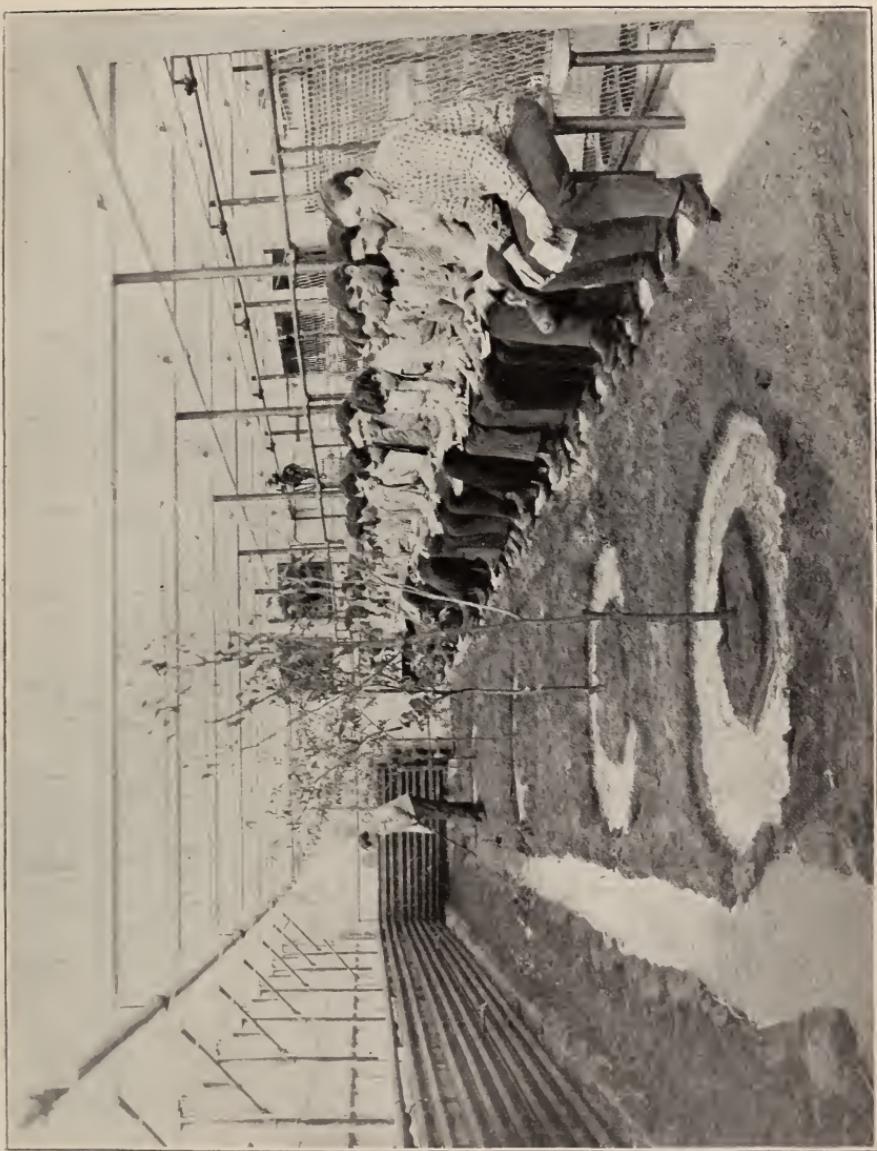
DEPARTMENT OF THE UNIVERSITY OF WISCONSIN.

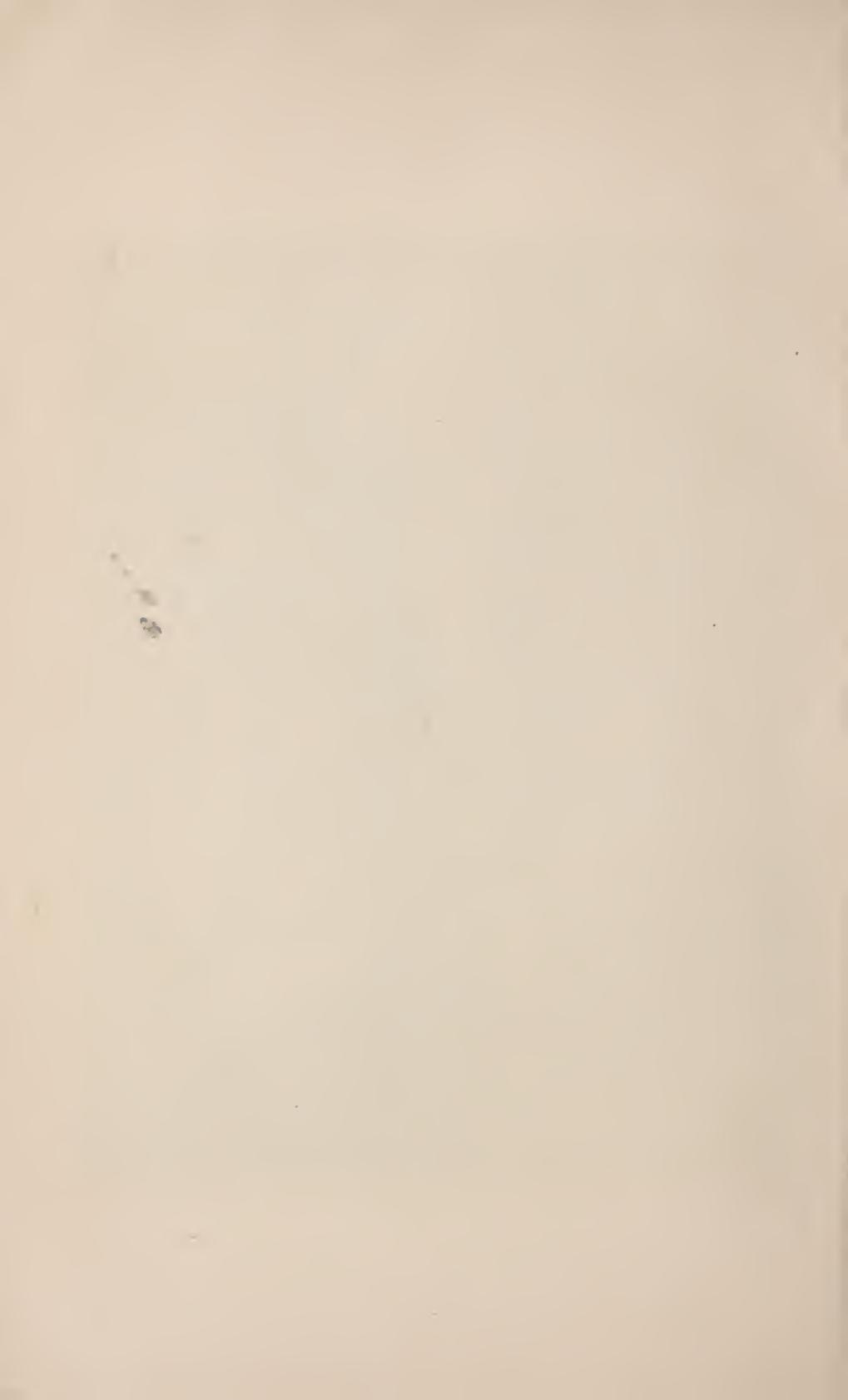
The work of the Wisconsin Station during the past year has been along the same lines as heretofore, including investigations in agricultural physics, especially studies of soils, drainage, and irrigation; chemical, bacteriological, and practical investigations in dairying, especially a study of the processes involved in the ripening of cheese; feeding experiments with pigs, lambs, and dairy cattle; horticultural investigations, and chemical analyses of feeding stuffs and fertilizers. Experiments with sugar beets have been conducted in cooperation with this Department. The facilities for investigations in horticulture and physics have been materially increased by the enlargement of the building used by these departments of the station. (See figs. 4, 5, and 6.) A handbook for farmers and a valuable treatise on "milk testing," by station officers, were published during the past year.



FIG. 4.—HORTICULTURAL-PHYSICS BUILDING OF THE WISCONSIN AGRICULTURAL COLLEGE AND EXPERIMENT STATION.

Fig. 5.—A LESSON IN IRRIGATION IN THE HORTICULTURAL-PHYSICS BUILDING OF THE WISCONSIN AGRICULTURAL COLLEGE AND EXPERIMENT STATION.





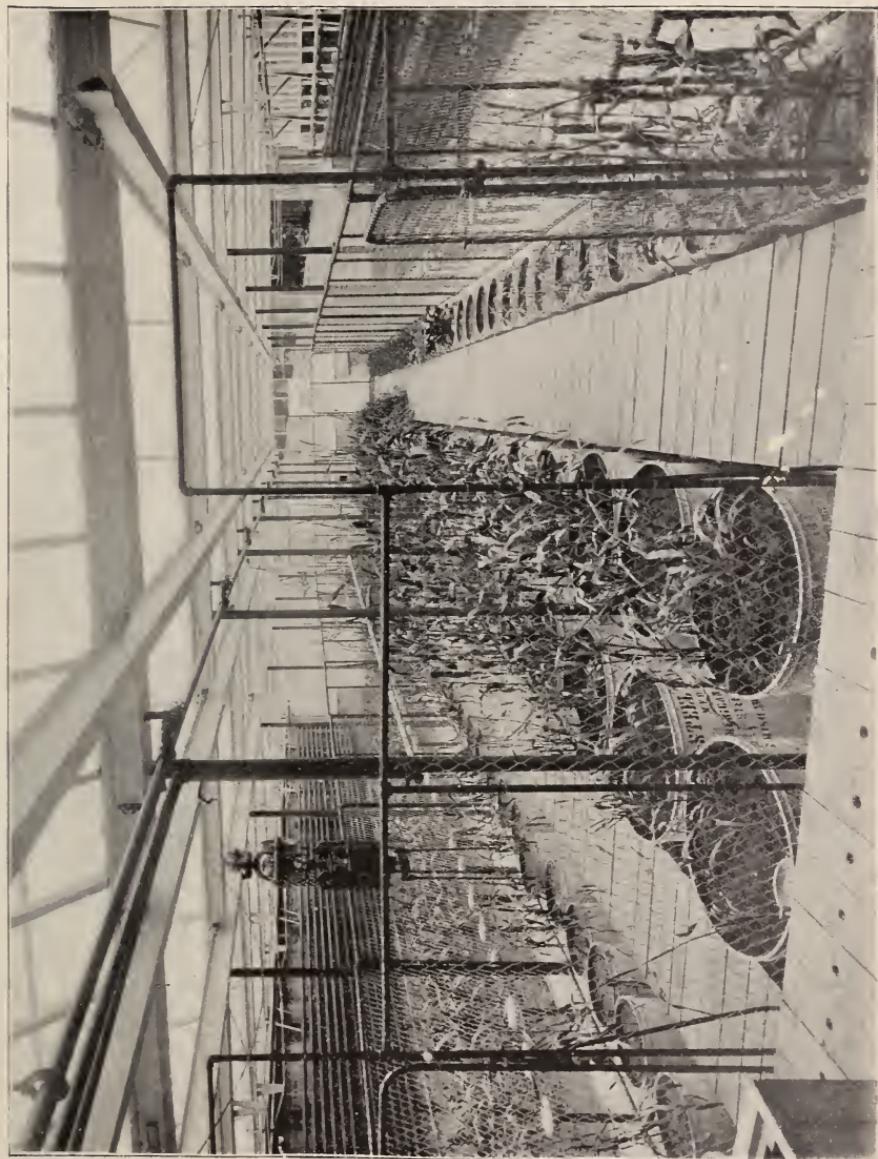


FIG. 6.—POT EXPERIMENTS IN THE HORTICULTURAL-PHYSICS BUILDING OF THE WISCONSIN AGRICULTURAL COLLEGE AND EXPERIMENT STATION.

The income of the station during the past fiscal year was as follows:

United States appropriation.....	\$15,000
State.....	10,000
Fees for fertilizer analyses.....	300
Farm products.....	1,700
 Total.....	 27,000

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 49-60 and the Annual Report for 1896.

Bulletin 49, pp. 32.—The Maintenance of Soil Fertility: Commercial Fertilizers.—General notes on the subject of fertilizers and their application; text of the State fertilizer law; and tabulated analyses and valuations of 10 samples of fertilizers.

Bulletin 50, pp. 13, figs. 3.—The Hot-Water Treatment for the Prevention of Smut on Oats, Wheat, and Barley.—Popular notes on the injury and nature of smuts and on the Jensen hot-water treatment for their prevention.

Bulletin 51, pp. 16.—The Marls of Wisconsin.—Description and analyses of 44 samples of Wisconsin marls, accompanied by notes on the deposits of marls in the State and on the use of marl as a soil improver and for the manufacture of cement and quicklime.

Bulletin 52, pp. 16, figs. 3.—A Comparison of the Babcock Test and Gravimetric Method of Estimating Fat in Skim Milk.—The Alkaline Tablet Test of Acidity of Milk or Cream.—Drawings showing what fraction of a per cent is represented by the few globules of fat in the neck of the test bottle in testing skim milk; comparative tests of 12 samples of skim milk by the Babcock test and the gravimetric method; and a description of the alkaline tablet test for acidity in milk as now used at the university dairy school.

Bulletin 53, pp. 4.—Analyses of Licensed Commercial Fertilizers.—List of manufacturers complying with the State fertilizer law, and tabulated analyses and valuation of 11 samples of fertilizers.

Bulletin 54, pp. 8, figs. 2.—The Restoration of the Consistency of Pasteurized Cream.—Summarized results of station investigations on this subject, with a description of a simple method for determining the relative viscosity of cream.

Bulletin 55, pp. 40, figs. 4.—Beet-Sugar Production: Possibilities for a New Industry in Wisconsin.—A popular bulletin giving historical and statistical information, describing the methods of culture and the process of manufacture, and giving estimated cost of producing beets, manufacturing sugar, and erecting factories. Experiments performed during recent years are reviewed.

Bulletin 56, pp. 38.—Statistics from 52 Wisconsin Separator Creameries.—Statistics obtained from personal visits to factories concerning their milk supply, methods of manufacture, machinery, etc.

Bulletin 57, pp. 8.—Analyses of Licensed Commercial Fertilizers.—Explanations as to fertilizer analyses, technical terms, valuation of fertilizers, and tabulated analyses of 12 samples of fertilizing materials.

Bulletin 58, pp. 16, figs. 9.—The Rape Crop: Its Growth and Value for Soiling and Fattening Sheep and Swine.—A popular bulletin based on the results of station work.

Bulletin 59, pp. 31, figs. 14.—The Construction of Silos and the Making and Handling of Silage.—A popular bulletin describing and illustrating methods of building silos and making silage, with information concerning the weight of silage, the capacity of silos, and the results of experiments to ascertain the influence of silage odors on milk.

Bulletin 60, pp. 24, figs. 5, maps 2.—The Cheese Industry: Its Development and Possibilities in Wisconsin.—Statistical data relative to cheese making in the United States and the export trade, with remarks on the nutritive value of cheese; factors influencing the development of the cheese industry; development of the cheese and butter industry in the light of natural conditions; historical development of the cheese industry in Wisconsin, and the advantages of Wisconsin as a cheese-producing State.

Annual Report, 1896, pp. 336, figs. 61.—Contains report of the director on the work of the year; list of available station publications; feeding experiments with hogs and lambs; seeding grass lands without a nurse crop; investigations on the conditions affecting the consistency of milk; details of the work on which Station Bulletin 54 is based; investigations on the rise and fall of bacteria in cheddar cheese; pure lactic cultures of bacteria in cheese making; restriction of tuberculosis by isolation, and the use of affected animals for breeding purposes; tuberculin inoculations for the year 1896; reprint of Station Bulletin 52; moisture supply in cheese-curing rooms; test of dairy cows; influence of subsoiling on soil moisture; the treatment of swamps and humus soils; experiments in irrigation; draft of corn harvesters; experiments on the prevention of night frosts; notes on fruits; miscellaneous horticultural work; subirrigation experiments in the greenhouse; use of lath shading for glasshouses; subirrigation for large foliage beds; reprints of Station Bulletins 49–50; miscellaneous chemical work; a paper on the composition of feeding stuffs; text of the Wisconsin State fertilizer law; list of exchanges and acknowledgments; and a financial report for the fiscal year ending June 30, 1896.

The Wisconsin Station has enjoyed a prosperous and successful year. The university with which it is connected is in a highly prosperous condition and is making strenuous efforts to develop its agricultural department. A new college barn (containing rooms for lectures and practical exercises in the care and feeding of animals) is being erected, at a cost of at least \$15,000. The results of the investigations of the station on the restoration of the consistency of pasteurized cream and on the ripening of cheese (recently announced) are of general importance and have attracted widespread attention. The policy of the station is, as heretofore, to concentrate efforts on a few lines, to strengthen the work on the scientific side as much as possible by employing thoroughly competent experts and providing them with ample facilities and a secure tenure of office based on efficiency, to plan carefully the work with reference to the development of the agriculture of the State along lines which promise the best financial returns, and to present the results of the station's investigations in attractive and readable form. The high measure of success attained by this and other stations pursuing a similar policy is sufficient proof of its wisdom.

WYOMING.

Wyoming Agricultural Experiment Station, Laramie.

DEPARTMENT OF THE UNIVERSITY OF WYOMING.

The work of the Wyoming Station during the past year has included field experiments with cereals, sugar beets, forage plants, potatoes, and other vegetables grown with and without irrigation; studies of alkali and other soils; feeding experiments; irrigation investigations; botanical studies, especially of poisonous plants and fungi; and meteorological observations. The station is cooperating with the Department in experiments with sugar beets. The substations at Saratoga and Sundance were discontinued during the year, but work was carried on at Sheridan and Lander, though the expense of conducting these substations was somewhat reduced. The results obtained at the substations do not justify the further continuance of any of them. They have proved very expensive and have prevented the station from developing its work in lines of greater usefulness to the State.

The income of the station during the past fiscal year was as follows:

United States appropriation	\$15,000.00
Farm products	595.82
Total	15,595.82

A report of the receipts and expenditures for the United States fund has been rendered in accordance with the schedules prescribed by this Department, and has been approved.

The publications of this station received during the past fiscal year were Bulletins 28-31, Index Bulletin A, and the Annual Report for 1896.

Bulletin 28, pp. 172, figs. 3, map 1.—First Report on the Flora of Wyoming.—A preliminary report is given of the flora of Wyoming, based on extensive collections during the season of 1894 and 1895, representing about 1,600 numbers. A descriptive report is given of the itinerary of the expedition, together with critical notes on the different local floras and a list of species, with critical notes. Sixteen new species and varieties are described.

Bulletin 29, pp. 34, pls. 6.—Alkali.—Contains a brief description of the character and occurrence of alkali in Wyoming and of its effect upon soils and plants; reports of experiments on the influence of different amounts of alkali on the germination and growth of turnips, barley, rye, oats, wheat, and alfalfa; and suggestions regarding the reclamation of alkali soils.

Bulletin 30, pp. 10.—Stock Feeding Experiments at Lander.—The results of feeding experiments to compare the relative value of sugar beets and grain for steers and sheep.

Bulletin 31, pp. 52, pls. 15.—The Worst Weeds of Wyoming and Suggested Weed Legislation.—Popular notes are given on the nature, evolution, distribution, and classification of weeds, with detailed descriptions and methods for eradication of 15 of the worst species. A further list of 50 plants which may be more or less troublesome is given, and suggestions offered for the modification of the present weed law, in order to make it more efficient.

Index Bulletin A, pp. 15.—A list of the first 26 bulletins of the station and index to contents.

Annual Report for 1896, pp. 30, Appendix, pp. 320.—Includes brief

notes on the bulletins issued by the station during the year, plan of station work, financial statement for the fiscal year ending June 30, 1896, and reports by the director and heads of departments on the work of the year. The appendix contains reprints of bulletins issued during the year.

The Wyoming Station has given considerable attention to the reorganization of its work during the past year. Definite progress has been made in the abandonment of the expensive substations and the substitution of cooperative enterprises with a view to aiding farmers in different parts of the State. It is believed that by carrying on more thorough investigations in a few lines of general importance and by helping farmers in different localities in the solution of the simpler problems which immediately confront settlers in a new region the station can easily render more efficient service than it has hitherto.

THE ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.

The object of this association as defined in the constitution is "the consideration and discussion of all questions pertaining to the successful progress and administration of the colleges and stations included in the association and to secure, to that end, mutual cooperation." How well and in what ways this object is being attained as regards the experiment stations may probably best be shown by a brief summary of the proceedings of the eleventh annual convention of the association, held in Minneapolis, Minn., July 13-15, 1897. There were present at this convention about 150 delegates and visitors, representing institutions for agricultural education and research in 39 States and Territories. While the proceedings developed an evident tendency among the members of the association to give increased attention to questions of policy and administration and to methods of teaching, the more technical questions of special importance in experiment-station work were given a fair amount of consideration.

A report from the section on agriculture and chemistry on the relations of college and station work excited the keenest interest and provoked a lively discussion, the relative importance of investigational and instructional work being very fully discussed. Another subject which was very freely discussed was the relative importance of strictly scientific and so-called practical work in the stations, some insisting that the purely scientific work should be subordinated to the practical work. This view, however, was vigorously combated.

The report of the section on horticulture and botany suggested that the association might with advantage organize investigations by the stations on subjects of general interest in horticulture and botany as in other fields, thus attaining one of the important objects of the association, namely, cooperation. The interest of the association in cooperative work of various kinds is indicated by the following subjects which were discussed and acted upon at the convention: Cooperative indexing of agricultural literature, uniformity of nomenclature, publications, methods of seed testing and fertilizer inspection; dissemination of information relating to agricultural investigations, cooperative exhibits, etc. The variety of interests represented is indicated by the following list of subjects on which papers were presented: Sugar-beet industry, methods of keeping records of horticultural work, classification of peaches and their variation with climate, a bacterial disease of cabbage and cauliflower, injurious insects,

electrical engineering in Utah, calorimeter investigations of the heat value of corn, university extension, etc.

It will be seen from this brief summary that the conventions of this association afford opportunities for the discussion of new discoveries, exchange of experiences, consideration of best methods of work, the announcement of proposed investigations, so as to bring out suggestions and prevent unnecessary duplication of work, and the suggestion of lines of investigation on subjects of general interest; and in general to promote the advance of the science of the subjects considered.

TABLE 1.—General statistics of the agricultural experiment stations in the United States, 1897.

AGRICULTURAL EXPERIMENT STATIONS.

Station.	Location.	Director.	Date of original organization.	Date of organization under Hatch Act.	Number of teachers on staff.	Number of ad-dresses on mailing list.	Publications during fiscal year 1896-97. Number of pages.	Number of addresses on mailing list.	Principal lines of work.
Alabama (College)	Auburn	W. L. Broun	Feb. 24, 1883	Feb. 24, 1888	11	8	13	5,22	Botany; analysis of fertilizers and food materials; soil improvement; field experiments; horticulture; diseases of plants and animals.
Alabama (Canebrake)	Uniontown	H. Benton	Jan. 1, 1886	Apr. 1, 1888	3	—	1	8	Field experiments; diseases of animals.
Arizona	Tucson	J. W. Trouncey	—	1889	9	4	5	130	Meteorology; field experiments; canague investigation; diseases of plants; entomology; chemistry of foods; field experiments; horticulture; diseases of plants; feeding animals; diseases of animals.
Arkansas	Fayetteville	R. L. Bennett	—	1887	8	4	7	372	Chemistry of foods; field experiments; horticulture; diseases of plants; feeding animals; diseases of animals.
California	Berkeley	E. W. Hilgard	1875	1888	26	9	8	600	Physics; botany; meteorology; chemistry and geographical distribution of soils; field crops; horticulture; technology of wine and olive oil and zymology; chemistry of foods and feeding stuffs; entomology; drainage and irrigation; remediation of alkali lands.
Colorado	Alston Ellis	—	1879	Feb. 24, 1888	18	6	5	438	Chemistry; botany; meteorology; field experiments; horticulture; entomology; irrigation.
Connecticut (State)	New Haven	S. W. Johnson	Oct. 1, 1875	May 18, 1887	14	—	3	519	Chemistry; analysis and inspection of fertilizers and foods; field and pot experiments; horticulture; seed tests; diseases of plants; chemistry of feeding stuffs and dairy products.
Connecticut (Storrs)	Storrs	W. O. Atwater	—	do	6	1	3	292	Food and nutrition of men and animals; bacteriology of dairy products; field experiments; dairying.
Delaware	Newark	A. T. Neale	—	Feb. 21, 1888	6	4	79	Chemistry; field experiments; horticulture; diseases of plants; feeding experiments; diseases of animals; entomology; dairying.	

Florida	Lake City	W. F. Yocom	1888	8	4	5	225	3,729		
Georgia	Experiment	R. J. Redding	Feb. 18, 1888	July 1, 1889	6	1	168	10,000		
Idaho	Moscow	F. B. Gault	Feb. 26, 1882	7	6	2	131	3,000		
Illinois	Urbana	E. Davenport	Mar. 21, 1888	10	7	5	136	16,000		
Indiana	Lafayette	C. S. Plumb	1885	Jan. —, 1888	10	6	23	182	13,698	
Iowa	Ames	C. F. Curtiss	—	Feb. 17, 1888	16	15	4	282	16,000	
Kansas	Manhattan	Thos. E. Will	—	Feb. 8, 1888	12	7	8	208	6,000	
Kentucky	Lexington	M. A. Scovell	Sept.—, 1885	Apr. —, 1888	9	3	5	104	6,000	
Louisiana (Sugar)	New Orleans	Wm. C. Stubbs	Sept.—, 1885	—	8	—	—	—	—	
Louisiana (State)	Baton Rouge	do	—	(Apr. —, 1886	—	9	8	7	167	7,000
Louisiana (North)	Calhoun	do	—	May —, 1887	—	5	—	—	—	—
Maine	Orono	C. D. Woods	Mar. —, 1885	Oct. 1, 1887	12	6	7	311	9,800	
Maryland	College Park	R. H. Miller	1888	Apr. 1, 1888	11	2	11	382	7,500	

Chemistry; field experiments; horticulture; entomology.
Field experiments; dairy ing.
Physics; chemistry; botany; field experiments; entomology.
Chemistry; bacteriology; field experiments; horticulture; forestry; diseases of plants; feeding experiments; entomology.
Chemistry; pot and field experiments; horticulture; feeding experiments; diseases of animals.
Chemistry; field experiments; horticulture; diseases of plants; feeding experiments; entomology.
Chemistry; botany; soils; horticulture; diseases of plants; feeding experiments; diseases of animals; entomology.
(Chemistry; soils; fertilizer analysis; field experiments; horticulture; diseases of plants; entomology; dairy ing.
Chemistry; botany; geology; bacteriology; soils; field experiments; horticulture; feeding experiments; entomology.
Chemistry; soils; fertilizers; field experiments; horticulture; sugar making; stock raising; dairy ing.
Chemistry; botany; analysis and inspection of fertilizers and concentrated commercial feeding stuffs; horticulture; diseases of plants; food and nutrition of men and animals; diseases of animals; entomology; dairy ing.
Chemistry; soils; field experiments; horticulture; feeding experiments; entomology.

AGRICULTURAL EXPERIMENT STATIONS.

TABLE 1.—General statistics of the agricultural experiment stations in the United States, 1897—Continued.

Station.	Location.	Director.	Date of original organization.	Date of organization under Hatch Act.	Number of teachers on staff.	Number of staff.	Publications during fiscal year 1896-97.	Number of addresses on mailing list.	Principal lines of work.
Massachusetts.....	Amherst.....	H. H. Goodell	* 1862	Mar. 2, 1888	21	.....	8	467	15,646
Michigan.....	Agricultural College.....	C. D. Smith .....	.....	Feb. 26, 1888	17	7	214	22,000	Botany and bacteriology; field experiments; horticulture; foraging; diseases of plants; feeding experiments; diseases of animals; entomology; dairy ing; field experiments; plant and animal breeding; feeding experiments; diseases of animals; entomology; dairy ing.
Minnesota.....	St. Anthony Park	W. M. Liggett	Mar. 7, 1885	1888	13	9	7	475	17,000
Mississippi.....	Agricultural College.....	W. L. Hutchinson.....	.....	Jan. 27, 1888	13	4	3	35	10,000
Missouri.....	Columbia	H. J. Waters .....	.....	Jan. —, 1888	11	6	14	189	12,000
Montana.....	Bozeman.....	S. M. Emery .....	.....	July 1, 1893	7	4	4	70	5,146
Nebraska.....	Lincoln	G. E. MacLean .....	.....	June 13, 1887	17	8	5	136	5,896
Nevada.....	Reno	J. E. Stubbs .....	.....	May 1, 1888	7	4	4	95	1,600
New Hampshire.....	Durham	C. S. Murkland .....	.....	Aug. 4, 1887	12	5	7	100	9,000

³ In 1882 the State organized a station here and maintained it until June 18, 1895, when it became part of the Hatch Station at same place.

AGRICULTURAL EXPERIMENT STATIONS.

TABLE 1.—General statistics of the agricultural experiment stations in the United States, 1897—Continued.

Station.	Location.	Director.	Date of original organization.	Date of organization under Hatch Act.	Number in staff.	Number of teachers on staff.	Publications during fiscal year 1896-97.	Number of addresses on mailing list.	Principal lines of work.
					Num. ber Pages. per. ber.	Num. ber.			
Rhode Island	Kingston	J. H. Washburn		July 30, 1888	10	3	369	4,900	Chemistry; meteorology; soils; field and pot experiments; horticulture; diseases of plants; poultry experiments; oyster culture; analysis and control of fertilizers; field experiments; horticulture; dairy ing.
South Carolina	Clemson College	H. S. Hartzog		Jan. 1, 1888	16	10	6	114	Bacteriology; chemistry of soils and soil physics; field experiments; forestry; diseases of plants; entomology.
South Dakota	Brookings	J. H. Shepard		Mar. 13, 1887	9	5	6	240	Chemistry; botany; field experiments; horticulture; entomology.
Tennessee	Knoxville	C. F. Vanderford	June 8, 1882	Aug. 4, 1887	10	3	5	199	Chemistry; botany; field experiments; horticulture; entomology.
Texas	College Station	J. H. Connell		Jan. 25, 1888	14	8	5	186	Chemistry; botany; field experiments; horticulture; diseases of plants; feeding experiments; diseases of animals; entomology.
Utah	Logan	L. Foster		1890	11	9	8	376	Chemistry; bacteriology; meteorology; soils; field experiments; horticulture; forestry; feeding experiments; poultry; dairy ing; irrigation.
Vermont	Burlington	J. L. Hills		Nov. 24, 1886	Feb. 28, 1888	13	5	8	Chemistry; analysis and control of fertilizers; field experiments; horticulture; diseases of plants; feeding experiments; dairy ing.
Virginia	Blacksburg	J. M. McBryde		1888	1891	10	8	11	Chemistry; fertilizer; diseases of plants; feeding experiments; entomology.
Washington	Pullman	E. A. Bryan			1891	8	8	172	Chemistry; soils; bacteriology; field experiments; horticulture; diseases of plants; feeding experiments; entomology.
West Virginia	Morgantown	J. H. Stewart			June 11, 1888	12	6	3	Chemistry; analysis and control of fertilizers; field experiments; horticulture; feeding experiments; poultry experiments; entomology.

Wisconsin	Madison	W. A. Henry	1883	1887	19	9	13	528	12,000	Chemistry; soils; field experiments; horticulture; feeding experiments; diseases of animals; dairying; drainage and irrigation.
Wyoming	Laramie	F. P. Graves	1887	Mar. 1, 1891	10	6	6	238	3,146	Geology; botany; meteorology; waters; soils; fertilizers; field experiments; food analysis; feeding experiments; entomology.
	Total				628	283	407	15,735	506,101	

TABLE 2.—*Revenue of the agricultural experiment stations in 1897.*

South Carolina	15,000.00	700.00		377.53	15,377.53	1,379.94	245.46	1,379.94	643.50	108.50	108.50	2,974.54
South Dakota	15,000.00			466.06	16,166.05	163.52	163.52	163.52	841.28	.....	162.07	2,110.06
Tennessee	15,000.00			541.44	16,020.44	187.98	187.98	187.98	28.87	.....	162.07	2,110.06
Texas	15,000.00				17,500.00	90.28	31.53	29.00	219.74	160.00	78.85	444.51
Utah	15,000.00	2,500.00				3,655.05	471.88	19,026.93	85.89	361.72	973.89	2,735.16
Vermont	15,000.00				3,055.30	19,966.97	1,103.64	94.17	185.56	192.63	1,750.40	1,750.40
Virginia	15,000.00				3,184.76	18,612.01			200.00	25.00	300.00	160.00
Washington	15,000.00				943.92	15,913.92	136.61	9.50	7.00	241.58	125.00	1635.60
West Virginia	15,000.00				5,452.72	145.15	137.46	764.61	271.00	284.69	164.81	658.94
Wisconsin	15,000.00	10,000.00			300.00	1,700.00	27,000.00	1,500.00	500.00	800.00	300.00	3,600.00
Wyoming	15,000.00					16,595.82	500.00	98.81	172.15	169.92	156.00	196.00
Total	719,993.47	287,176.35	5,553.88	37,265.20	64,437.83	16,306.20	1,129,832.99	74,830.99	12,993.25	21,149.73	13,178.25	14,738.07
												7,714.08

* Including the balance on hand. The appropriation for 1896 was \$28,900; and for 1897, \$29,400.

* Including the balance on hand.

TABLE 3.—Expenditures of the agricultural experiment stations from the United States appropriation for year ending June 30, 1897.*

Station.	Amount.	Salaries, Labor.	Publica- tions.	Post- age and express for station- ery.	Heat, light, and water.	Chem- ical sup- plies.	Ferti- lizers, stuffs.	Feed- ing stu- ffs.	Li- brary.	Seeds, plants, and sundry sup- plies.	Tools, imple- ments, and ma- chinery.	Furni- ture and fix- tures.	Sci- entific appa- ratus.	Live stock.	Trav- eling ex- penses.	Con- ting- ent ex- penses.	Build- ing and re- pairs.		
Alabama	\$15,000	\$7,829.97	\$1,070.66	\$1,325.94	\$211.37	\$378.66	\$283.55	\$99.13	\$788.32	\$29.62	\$261.52	\$848.84	\$59.17	\$14.63	\$237.12	\$64.95	\$250.55		
Arizona	15,000	\$7,914.94	1,087.45	1,335.15	100.66	49.56	204.32	189.91	131.75	221.91	17.34	182.29	447.18	27.18	457.86	424.00	80.65		
Arkansas	15,000	\$5,599.80	1,553.48	1,637.35	214.40	58.25	383.90	577.95	11.1	113.03	248.16	24.36	68.80	136.52	12.60	503.75	98.75	497.11	
California	15,000	\$5,219.50	1,282.11	282.64	337.19	314.08	137.85	192.05	839.46	194.89	339.58	128.25	245.88	161.05	65.00	672.40	8.85	530.18	
Colorado	15,000	\$9,390.40	1,635.76	838.00	28.29	79.50	4.00	130.65	485.11	85.00	631.17	7.18	62.46	25.90	136.11	702.86	498.63	10.00	
Connecticut, State	7,500	5,500.00	1,006.03	1,500.39	202.21	108.38	325.91	190.05	190.05	148.64	7.27	154.15	460.23	258.95	205.01	125.49	11.50	125.49	
Delaware	15,000	\$3,642.98	1,006.03	1,500.39	202.21	108.38	325.91	190.05	190.05	148.64	7.27	154.15	460.23	258.95	205.01	125.49	11.50	125.49	
Florida	15,000	\$9,876.49	1,162.65	1,633.77	222.85	90.15	239.26	201.35	208.77	7.68	91.17	692.15	14.15	44.73	89.96	445.25	94.08	97.67	
Georgia	15,000	\$5,056.68	1,158.25	733.21	301.22	160.93	306.32	21.1	106.54	611.20	183.94	129.15	82.00	120.00	419.98	76.70	643.07		
Idaho	15,000	\$8,500.00	1,934.36	1,577.22	132.39	136.55	108.39	34.01	507.63	640.00	65.35	82.00	20.06	141.11	301.91	226.16	113.41	259.02	
Illinois	15,000	\$5,347.06	2,835.28	208.83	220.44	674.34	540.48	62.59	286.62	93.50	93.50	144.84	385.00	336.44	347.98	140.13	487.67	304.99	
Indiana	15,000	\$7,684.06	1,224.69	639.04	1,197.53	144.58	93.16	25.91	25.91	25.78	16.84	16.84	16.84	16.84	16.84	16.84	16.84	255.07	
Iowa	15,000	\$8,817.13	2,834.56	787.56	106.63	97.73	382.16	305.76	539.24	25.78	219.32	165.84	225.66	68.17	175.50	102.27	16.48	122.49	
Kansas	15,000	\$6,681.16	2,210.36	846.27	459.43	562.06	591.34	266.30	1,000.13	622.17	11.93	365.44	40.90	10.94	346.01	368.92	30.00	427.68	
Louisiana	15,000	\$9,640.02	3,078.46	1,422.44	23.47	6.15	276.06	107.94	242.96	9.25	—	348.32	76.04	14.36	12.80	201.86	12.90	139.63	
Maryland	15,000	\$8,401.58	2,382.17	590.01	1,122.10	61.54	473.40	235.41	188.76	368.96	418.97	178.56	80.20	127.50	339.56	75.05	75.05	372.02	
Massachusetts	15,000	\$9,017.19	1,333.24	523.00	312.48	203.33	557.35	588.96	67.25	450.88	67.45	450.88	207.02	34.00	218.97	497.95	389.32	16.36	
Michigan	15,000	\$8,267.26	2,559.39	992.15	182.72	136.96	495.80	77.15	314.60	132.52	293.63	65.20	20.59	295.27	50.72	43.42	35.60	254.54	
Minnesota	15,000	\$3,067.44	3,312.26	2,354.00	246.11	144.78	193.31	417.73	424.95	100.48	308.84	160.79	138.95	272.21	233.26	42.73	564.25	16.36	
Mississippi	15,000	\$10,151.64	1,601.87	125.84	134.55	164.88	677.59	441.18	244.00	314.55	110.11	418.94	512.14	36.10	273.20	226.44	226.44	184.50	
Missouri	15,000	\$9,570.71	3,286.96	561.00	189.44	346.42	320.00	180.00	470.67	51.33	185.35	124.75	124.75	129.23	94.53	36.57	146.27	218.10	
Montana	15,000	\$6,872.58	3,040.71	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	1,555.00	
Nebraska	15,000	\$8,051.16	1,733.09	663.90	329.32	166.57	61.13	379.91	387.39	11.89	73.82	375.58	279.79	61.85	724.96	613.32	258.95	75.87	75.00
New Hampshire	15,000	\$9,865.42	3,360.65	329.70	43.66	184.56	184.56	184.56	184.56	184.56	184.56	184.56	184.56	184.56	184.56	184.56	184.56	38.18	
New Jersey	15,000	\$6,630.00	2,082.33	860.93	319.68	161.00	23.33	531.59	80.29	271.92	74.79	74.79	74.79	143.45	665.39	187.00	187.00	187.00	
New Mexico	15,000	\$8,220.02	2,604.90	323.03	122.56	267.94	101.76	381.71	479.79	62.40	92.74	136.83	182.62	131.97	55.72	754.50	209.50	750.00	
New York, State	15,000	\$1,204.99	65.00	155.68	155.68	155.68	155.68	155.68	155.68	155.68	155.68	155.68	155.68	155.68	155.68	40.16	8.85	16.36	
New York, Cornell	13,500	\$8,043.75	1,988.57	299.60	251.05	118.75	63.64	117.49	651.37	104.83	108.22	56.95	126.68	722.82	301.10	145.88	10.00	249.10	
North Carolina	15,000	\$7,755.13	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	2,993.36	
North Dakota	15,000	\$10,120.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	2,181.00	
Ohio	15,000	\$5,180.00	3,253.83	995.02	141.70	197.48	106.45	97.85	347.95	27.60	22.80	37.56	165.75	300.95	1,657.75	1,657.75	1,657.75	1,657.75	
Oklahoma	15,000	\$10,187.54	936.98	657.09	104.22	154.40	13.25	216.91	23.00	154.49	28.25	154.49	221.00	39.33	997.22	106.80	663.53	39.11	
Oregon	15,000	\$11,115.80	1,075.25	433.63	1,075.25	433.63	433.63	433.63	433.63	433.63	433.63	433.63	433.63	433.63	433.63	21.53	29.96	21.53	

Rhode Island	15,000	9,068.89	2,076.86	1,143.60	122.84	222.11	136.50	39.67	729.44	350.78	29.00	16.40	170.42	47.39	45.81	75.25	150.43	16.75	527.86
South Carolina	15,000	8,529.47	1,213.52	320.39	183.84	115.28	11.62	1,379.91	353.33	222.09	215.70	215.46	603.50	127.85	132.05	108.50	568.52	20.90	637.14
South Dakota	15,000	7,700.00	2,514.55	1,356.45	189.90	253.45	176.22	395.84	395.84	39.16	322.62	841.28	102.67	532.59	223.87	10.00	501.00	10.00	748.80
Tennessee	15,000	9,073.34	2,510.84	953.94	128.69	76.98	383.25	202.93	138.14	43.75	187.98	28.87	43.70	183.70	231.78	231.78	231.78	231.78	231.78
Texas	15,000	9,776.27	713.68	1,188.76	323.76	282.34	23.67	322.09	571.14	217.25	462.66	311.63	219.74	78.85	20.00	160.00	196.35	213.92	157.99
Utah	15,000	5,193.79	4,014.22	726.30	193.37	169.43	145.28	94.12	747.54	15.00	617.76	85.89	677.68	253.62	361.72	1,016.25	70.70	11.00	506.33
Vermont	15,000	4,007.82	5,000.66	1,556.45	254.53	106.69	908.83	310.38	387.67	276.76	414.51	72.73	131.20	40.95	142.64	175.60	305.02	105.87	679.28
Virginia	15,000	8,588.80	2,500.00	1,099.13	105.90	113.34	167.35	144.86	731.60	75.82	142.95	900.06	27.05	285.68	125.00	248.60	10.00	136.61	197.37
Washington	15,000	5,631.12	4,206.85	407.75	115.17	159.57	28.13	14.14	163.86	634.91	73.31	91.50	241.58	15.00	7.00	125.00	248.60	10.00	136.61
West Virginia	15,000	9,328.08	1,684.03	1064.48	292.64	404.30	1064.48	292.64	292.64	404.30	386.68	271.00	225.87	290.71	384.49	658.91	4.00	18	384.49
Wisconsin	15,000	7,936.60	2,868.35	82.76	295.74	233.70	185.56	567.56	151.24	11.50	221.63	330.25	371.03	5.89	500.39	1,100.21	185.45	53.38	53.38
Wyoming	15,000	6,414.36	3,476.81	957.88	205.64	146.74	904.06	313.60	220.21	51.85	128.01	5.81	182.01	172.15	303.48	156.00	506.13	43.75	737.35

* The expenditures under different heads are affected by the total revenue of the station as shown in Table 2.

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